WEB-BASED WORKSHOP:

NUTRITION AND OBESITY EDUCATION TOOLS AND RESOURCES FOR MEDICAL STUDENTS

A Thesis

by

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ABSTRACT

Lack of nutrition education is one of the most common barriers reported by physicians to discussing nutrition and obesity-related chronic health conditions and giving dietary and weight-loss guidance to their patients. Challenges with integrating nutrition education into medical school curriculums have been addressed by utilizing web-based learning opportunities.

A web-based workshop (WBW), providing nutrition and obesity education tools and resources, was developed and pilot-tested to 1st through 4th-year medical students. A focus group provided valuable feedback on the WBW for revisions prior to the pilot test. A pretest survey and posttest evaluation survey were developed to assess prior nutrition training, evaluate changes in nutrition attitudes, perceived self-efficacy, and nutrition and obesity knowledge after accessing the WBW, and to evaluate the content and value of the WBW. Paired sample t-tests were performed to evaluate these changes, and descriptive and qualitative analyses were used to evaluate survey and focus group results. Subsequent recommendations for the next phase of the WBW were noted.

Fewer than 50% of medical student pretest survey respondents reported ever having received prior nutrition training before accessing the WBW. Although a statistically significant change in nutrition attitudes, perceived self-efficacy or nutrition and obesity knowledge was not observed in our study, 11 respondents (100%) agreed that the WBW enhanced their knowledge of nutrition and its role in prevention and treatment of obesity and chronic disease, 7 thought the WBW was applicable to medical students (63.6%), and 8 would recommend it to their peers (72.7%).

A WBW was successfully created and administered to TAMHSC COM students. It was designed to serve as a clinically applicable nutrition and obesity resource in medical school curricula that would enhance nutrition attitudes, perceived self-efficacy, and nutrition and obesity knowledge. Since the WBW developed represented an initial pilot phase of a planned multi-year endeavor, future research will likely address not only content issues, but also WBW participation, survey respondent rates, and will seek revisions to enhance the WBW for possible future applications.

DEDICATION

I dedicate this work to my Heavenly Father who has given me my passion for nutrition and the endurance and resources to complete this project; to my husband, Austin, for his never-ending love, support and encouragement, and to my family for supporting me throughout my education.

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Last but not least, I want to thank my immediate and church family for their love, support and prayers.

NOMENCLATURE

CAM	Complementary and Alternative Medicine
COM	College of Medicine
HLKN	Health and Kinesiology
FG	Focus Group
NAQ	Nutrition Attitudes Question
NKA	Nutrition and Obesity Knowledge Questions
NUTR	Nutrition
PES	Posttest Evaluation Survey
PS	Pretest Survey
PSEQ	Perceived Self-Efficacy Questions
RD	Registered Dietitian
TAMHSC	Texas A&M Health Sciences Center
WBW	Web-Based Workshop

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1. INTRODUCTION

According to the most recent data, over 35% of U.S. adults and nearly 17% of children and adolescents are obese [1]. Overweight and obesity are considered major risk factors in the development of the most common and fatal chronic diseases. In 6 out of the 10 leading causes of death in the U.S., cardiovascular disease (CVD), cancer, stroke, type 2 diabetes, cirrhosis and atherosclerosis, dietary factors are most likely to blame [2]. Additionally, risk factors such as hypertension, hyperlipidemia and arthritis are significantly associated with excess body weight [3]. However, studies have shown obese individuals diagnosed with type 2 diabetes, hyperlipidemia and hypertension experience positive health benefits from a modest 10% weight loss [2]. In June, 2013, obesity officially became recognized as a disease by the American Medical Association (AMA), indicating a substantial need for changes in medical interventions and pressuring physicians to address obesity concerns with their patients. In one study, 62% and 49% of patients expect their primary care physicians to discuss nutrition and weight reduction, respectively, to those who need it [4]. Although primary care providers express confidence in the importance of nutrition in health maintenance and disease prevention, according to recent surveys, the public's need for reliable and adequate dietary guidance and physician deliverance is widely disproportionate [5].

The lack of nutrition education received in medical school has been a commonly reported barrier to physicians investigating nutrition- and obesity-related conditions with their patients [5]. In one survey, 68% of primary care physicians reported having received inadequate nutrition training during medical school and 86% suggested more

nutrition education should be required in the curriculum [2]. In 1985, the National Research Council, Committee on Nutrition in Medical Education concluded that medical students need a minimum of 25 credit hours of nutrition instruction to be adequately equipped to address their patients' common nutrition concerns [2, 6]. According to the latest update of U.S. medical schools, out of the 109 schools surveyed, only 27% are meeting the required credit hours for nutrition education [7]. Today, within the Texas A&M University (TAMU) College of Medicine (COM) program, the only required nutrition education medical students receive is through a 4-week, 5-credit-hour Metabolism/GI/Nutrition course [8]. The current nature of medical school curriculums poses challenges to integrating nutrition instruction adequate enough to meet the needs of future physicians. Lack of time and space within the curriculum, emphasis on curative medicine rather than disease prevention, absence of trained professionals and misperception of nutritional relevance among others have been reported as barriers of integrating nutrition education in the medical school curriculum [9, 10]. Consequently, the deficit of nutrition education in medical schools have left physicians feeling both uncomfortable and incapable of successfully addressing weight-management issues and delivering dietary guidance to their patients [5].

In recent years, the medical school accrediting agency has been requiring programs to reduce the number of credit hours students spend in traditional lectured instruction and introduce more independent learning experiences into their curriculum [11]. This has since created opportunities to implement nutrition education through web-based teaching experiences. Advantages to using computer-assisted instruction to teach

nutrition education to medical students include self-directed, independent learning and flexibility, increased student knowledge and understanding in a particular area, access to learning materials and resources, and confronts the challenges of curriculum time constraints, reduced program and staff funding, increases in geographical dispersal, and rise in student numbers [12-14]

This research study, funded by the Allen Foundation Inc., focused on the development and evaluation of a web-based workshop (WBW) to educate medical students on nutrition principles and concepts, as well as provided educational tools and resources specific to adult and childhood obesity. Relating to obesity and nutrition education, the WBW encompasses the core medical school competencies including 1) Medical Knowledge 2) Patient Care 3) Interpersonal and Communication Skills 4) Professionalism 5) Systems-Based Practice and 6) Practice-Based Learning and Improvement. Accomplished through a multitude of nutrition and physical activity guidelines, tools, educational resources and literature specific to obesity and obesity-related chronic diseases condensed into a single website, the WBW allows for a valuable and flexible learning experience by the medical students. To the best of our knowledge, no other workshop of this kind has ever been developed and tested using our methodology.

2. LITERATURE REVIEW

In recent years there has been increasing interest in and demand for incorporating nutrition concepts and theory as related to disease treatment and prevention into medical education and practice. Therefore, many studies have been performed to evaluate these parameters and to find the best means of providing current and future healthcare professionals with nutrition education. Block, DeSalvo, and Fisher, administered a survey to 87 internal medicine residents in two university-based residency programs to assess whether interns are suited to treat the increasing number of obese patients, their familiarity with obesity measurement tools, and their knowledge and attitudes toward obesity treatment. Few residents reported prior training in obesity, > 60% and > 80% of residents underestimated the prevalence of obesity among women and men respectively. Nearly 90% knew obesity was a risk factor for hypertension, Type 2 diabetes, and sleep apnea, but 60% did not know the minimum BMI value for obesity and 69% did not believe waist circumference to be a reasonable measure for obesity. Ninety-eight percent of residents reported that treating obese patients is important, but only 44% felt qualified to treat obesity. This study revealed that despite having the knowledge of co-morbid conditions associated with obesity, residents have perceived low self-efficacy in both using measurement tools to assess obesity and discussing obesity treatment [15].

In a survey questionnaire, pediatricians, pediatric nurse practitioners and registered dietitians answered questions on their attitudes, perceived barriers and skill levels, and training needs in managing childhood and adolescent obesity. Respondents felt that childhood obesity is a condition that necessitates treatment (75%-93%),

increases the risk of chronic disease (76%-89%), and decreases quality of life (83%-93%). In this study, registered dietitians were less likely to report perceived barriers; however each group of professionals expressed strong desire for increased training in obesity management for children and adolescents. The most reported barriers for practitioners were lack of parent involvement, patient motivation and support services; pediatricians also reported lack of clinician time. Low-proficiency skill level was commonly reported in areas: use of behavioral management strategies (highest in pediatricians), guidance in parenting techniques and addressing family conflicts [16].

Using validated questionnaires and a multiple-choice quiz, Vetter et al., conducted a cohort study of internal medicine residents to evaluate attitudes, self-perceive proficiency, and knowledge related to clinical nutrition. Out of the 61 residents who completed the survey, 15% (N=9) reported having prior nutrition education in undergraduate or graduate coursework and 3% (N=2) reported taking at lease one nutrition elective course in medical school, if offered. Seventy-seven percent of residents agreed or strongly agreed nutrition assessment is necessary in primary care visits and 94% agreed or strongly agreed that it was their obligation as health care providers to discuss nutrition with their patients, but only 46% felt comfortable adequately calculating BMI and waist-to-hip ratio, and less than 1/3 felt confident assessing the nutrition status of patients or discussing nutrition-related issues. Results of the nutrition knowledge test revealed knowledge deficits in nutrition assessment and obesity (mean knowledge score= 62%), renal disease (58%), and cardiovascular nutrition (58%) [17].

Faculty from the Department of Nutrition at University of North Carolina, Chapel Hill, developed the Nutrition in Medicine (NIM) project to facilitate nutrition instruction to medical students through computer-assisted training and web-based curriculum. The NIM project was developed using a series of computerized learning modules on nutrition-related topics, featuring clinical cases and linking the science of nutrition to medical practice. Sixteen first-year medical students pilot tested the first of the nutrition education modules. Half (N=8) of the students utilized the module and the other half (N=8) attended a lecture course on the same subject material. Knowledge acquisition was evaluated through a standardized pretest and comprehensive posttest, which also evaluated program acceptance. Students using the computerized modules scored significantly higher on their posttest than the students who attended the lecture and reported the modules were both engaging and more valuable compared to the traditional lecture [18].

Conroy, Delichatsios, Hafler and Rigotti developed and implemented a preventive medicine and nutrition course curriculum for second-year medical students at Harvard Medical School. Students (N=137) enrolled in a 28-hour preventive medicine and nutrition (PMN) lecture course using alternative instruction methods including problem-based learning, simulated patient cases for counseling skill development, student-led debates, and self-assessment activities. 14 weekly sessions included 4 weeks of clinical preventive medicine, 8 weeks of clinical nutrition, 1 week on exercise and a final examination. A self-assessment of students' diet and exercise habits as well as a self-efficacy assessment for counseling patients on these behaviors were given and

evaluated pre and post-course. On a scale of 1 to 4 (1= very confident; 4= very unconfident) student response rate in the level of confidence they had from pre- and post-course, respectively, are as follows: 1) Advise family and friends about diet (2.43, 1.61) and exercise (2.07, 1.53); 2) Assess patient diet (2.55, 1.79) and exercise (2.14, 1.67); 3) Change patient diet (2.88, 2.01) and exercise (2.73, 2.02). With significance (p <.001), this study demonstrated that the PMN course enhanced second-year medical students' self-efficacy for assessing and changing patients' diet and exercise behaviors [19].

A controlled study of web-based course of complementary medicine (CAM) for medical students and residents was developed and conducted to evaluate the knowledge and attitude outcomes toward CAM. Internal medicine residents, family medicine residents, and 3rd and 4th year medical students from two medical schools (N=123) were divided into a control (no-intervention) and intervention group. The web-based CAM course emphasized theory- and evidence-based instruction methods, incorporating case scenarios, self-assessment, and review activities. A self-assessment survey (addressing attitudes, self-efficacy, and behaviors regarding CAM) was administered prior to the course. Following completion, students and residents completed a knowledge test, immediately and after three months completion, and post-assessment survey on attitudes and course evaluation. Knowledge scores were significantly greater in the intervention group (78.8 ± 10.1) compared to the control group (50.9 ± 8.5, p<.001) and remained higher three months later. Following the course, students and residents felt more comfortable discussing CAM options with patients, finding information, and

acknowledged a greater role for CAM in medical practice. Overall the course added value to medical practice, improved knowledge and viewpoints of CAM, and was received well [20].

In the Netherlands, Maiburg, et al., conducted a study to assess the degree to which web-based instruction enhances nutrition knowledge and practice behavior of general practitioner (GP) trainees. Using a knowledge test and 3 standardized patient visits to assess outcomes, the experimental group (N= 25) received approximately 6 hours of computer-based nutrition education while the control group (N= 24) completed the standard vocational training. Knowledge scores from the experimental group increased from 30% pretest to 42% posttest; the control group scores increase from 36% to 37%; a 9.2% difference in the experiment versus control outcome. The percentage of correctly performed items during the patient visits for the experimental group increased from 20% pretest to 36% posttest, while the control group only changed from 20% to 22%. Compared to the standard training curriculum, the web-based nutrition instruction showed effectiveness by increasing both nutrition knowledge and practice application [21].

The Committee on Medical/Dental School and Residency Nutrition Education organized pursuits to prioritize nutrition content in a medical school curriculum. Approximately 300 mail surveys were distributed to medical-nutrition educators and medical school curriculum planners addressing the issue of high priority nutrition topics for entry-level physicians. At a 65% respondent rate, topics categorized as *Essential* included, but not limited to: 1) Obesity (ranked # 1 in essentiality) 2) Diet,

hyperlipidemia, and atherosclerosis, 3) Diet and diabetes, 4) Nutrition assessment and support, 5) Diet and hypertension, 6) Body weight, body composition, and energy balance, and 7) Nutrition and cancer [22].

A random sample of 778 Washington Academy of Family Physicians members were mailed a survey to identify the top 10 patient nutrition inquiries that physicians would like to be better equipped to answer. From 306 physician responses, the top 10 priority nutrition topics included: 1) Weight loss/management (66.5%); 2) Herbs/botanicals/interaction/CAM (36.4%); 3) Vitamin/mineral supplements (24.4%); 4) Heart-healthy diets (21.1%); 5) Diabetic diet (20.4%); 6) Nutrition and other disease management; 7) Food/diet composition; 8) Osteoporosis/ menopause management; 9) Atkins/low carbohydrate, high protein diets; and 10) Pediatric nutrition [23].

Ultimately, recent literature suggests that currently practicing physicians are neither confident nor knowledgeable enough to recommend a nutrition intervention to at-risk patients; with the lack of nutrition education being a consistently reported impediment. Therefore, avenues such as web-based courses and instruction opportunities have been created to educate current and future medical doctors on nutrition and nutrition's role in weight management, disease treatment, and prevention. Based on current findings and reported physician priorities, a web-based workshop that provides medical students with nutrition educational tools and resources specific to adult and childhood obesity was proposed.

3. RESEARCH OBJECTIVE, HYPOTHESES AND ANTICIPATED OUTCOMES

3.1 Research Objective

The objective of this study is to develop and pilot-test a web-based workshop (WBW) to provide Texas A&M University Health Sciences Center (TAMHSC) College of Medicine (COM) students with nutrition and obesity educational tools and resources.

3.2 Research Hypotheses

My hypotheses for this project were as follows:

After accessing the WBW educational tools and resources

1. Medical students will report more positive attitudes towards the role of nutrition in medicine and their role in providing nutrition and obesity education to their patients.
2. Medical students will have an increased perceived self-efficacy in delivering nutrition and obesity education to their patients.
3. Medical students will be more knowledgeable in areas including
    a. The use of BMI and waist circumference for obesity assessment.
    b. Current dietary and physical activity guidelines for Americans.
    c. Good food sources for macronutrients and micronutrients involved in the treatment and prevention of diet and obesity-related diseases.
    d. Dietary recommendations for reducing the risk of diet and obesity-related chronic diseases.

4. Sufficient feedback will be provided to help revise and edit the WBW for the next phase of the project.

3.3 Expected Outcomes

In addition to having an increase in positive attitudes towards the role of nutrition in medicine, and an increase in perceived self-efficacy in delivering nutrition and obesity education to their patients, it was anticipated that TAMHSC COM students would demonstrate increased competence in critical areas to include: 1) calculate and categorize BMI and WC using the National Heart, Lung and Blood Institute (NHLBI) classification system, 2) explain the concept of energy balance and how it is related to the development of obesity, chronic disease and cancer, 3) explain the importance of quantity and quality of carbohydrate, protein, fat and fiber in the prevention and treatment of obesity, chronic disease and cancer, and 4) explain how physical activity influences the function of the body and impacts the risk of developing and managing obesity, chronic disease and cancer. Long term, it is anticipated that the information and skills learned from the WBW will ultimately carry over into evidence-based practice for physicians leading to improved health and reduced incidence of overweight and obesity and weight-related chronic diseases for their patients.

4. METHODS

The Web-Based Workshop (WBW) pilot-test study was carried out in three phases over the course of 10 months: 1) Pre-Implementation, 2) Implementation, and 3) Evaluation and Revision. My Logic Model for this study, which can be seen in the Appendix A, outlines the details of each phase of the pilot-study including the current situation, our inputs, activities, outputs, outcomes, and assumptions. Also included in Appendix B is my Gantt chart, an organized timeline of the activities completed for the pilot-study; also included in my Gantt chart is the timeline for my proposal and thesis development, illustrated by an asterisk (*). The WBW will eventually consist of two major components: 1) a webinar and 2) the WBW with nutrition and obesity educational tools and resources collected from reliable health organizations and evidence-based research. At this point in the study, only the WBW with educational tools and resources will be pilot-tested to TAMHSC COM students. The webinar is expected to be pilot-tested at a later date by Dr. Peter Murano (Principle Investigator, Director of the Institute of Obesity Research) and another graduate student. However, the primary focus of this project is on the development and evaluation of the WBW: Nutrition and obesity education tools and resources for medical students.

As reflected in the Logic Model and Gantt chart in Appendix A and B respectively, a focus group was held after the initial development of the WBW. Results from the focus group were used to edit and revise the WBW prior to the pilot test. Once the pilot-test was implemented via email, all first through fourth– year COM students were given the link to the WBW where they had convenient, open access to

comprehensive obesity, nutrition, and chronic disease information, tools, and resources. Hyperlinks to the online tools and resources were organized into lists, tables, images and "buttons" throughout structured pages within the WBW. The information, tools and resources were collected from reliable, national health organizations, science-based literature, and data reports. A change in nutrition attitudes, perceived self-efficacy, and nutrition and obesity knowledge were evaluated through one pretest survey (PS) and one posttest evaluation survey (PES). "Nutrition attitudes" here is defined as medical students' feelings toward and position on the importance of nutrition in patient care. "Perceived self-efficacy" is defined by the degree of confidence medical students have in delivering nutrition and weight-management education to overweight and obese patients. "Nutrition and obesity knowledge" is defined as the ability of medical students to correctly answer the survey questions on 1) BMI and waist circumference, 2) dietary and physical activity guidelines, 3) good food sources for macronutrients and micronutrients, and 4) dietary recommendations for reducing risk of chronic disease. COM students' views on the content, overall design, and value of the WBW were also evaluated on the PES.

4.1 Pre-Implementation

The pre-implementation phase took place from June 2013 to February 2014 (see Appendix B.) During these eight months, a preliminary WBW was developed, a focus group was conducted, and revisions were made to the WBW.

4.1.1 Development of the WBW

The development of the WBW began with reviewing the scientific literature on previously developed, web-based, nutrition education, as well as physician and medical student needs for nutrition education, developing web-based workshops, and nutrition education priority topics by physicians and medical students. PubMed, MEDLINE and the Texas A&M University Library databases were used to acquire the research literature. Keywords used in the searching tools are outlined in Table 1.

Table 1. Keywords for Searching Online Databases for WBW Development

Medical student	Nutrition	Education	Attitudes
Self-efficacy	Medical school	Web-based	Curriculum
Computer-based	Physician needs	Requirements	Workshop

Research literature used in developing the WBW included work done by Vetter[17], Carlton[24], Cook[20], Adams et al[6], and Kelly[25]. Listed below in Table 2, twenty-five priority nutrition topics by physicians and medical students were identified based on the NAA (Nutrition Academic Award) Nutrition in the Medical School Curriculum, and current research data from Mihalynuk et al [23], Weinsier et al [22], Adams et al [6], Block, DeSalvo and Fisher [15], and Kelly [25]. Based on the scientific literature and priority nutrition topics, an outline for the WBW was created and revised through a series of research team meetings (see Appendix C). Table 3 outlines

the foundational national health organizations where the majority of the WBW tools and resources were obtained. Hyperlinks to resources from a variety of these national health organizations were assembled into a Word document outline before being organized into the WBW.

Table 2. Top 25 Priority Nutrition Topics Based on Physician Response

1. Weight Management [1-3]	6. Diet for disease prevention [1,3]	11. Diet, hyperlipidemia, and atherosclerosis [2,3]	16. Nutrition and GI disease [2,3]	21. Nutrition prescriptions and referrals [3]
2. Obesity [2-4]	7. Lifecycle nutrition [1,3]	12. Lipids [2]	17. Nutrition and renal disease [2,3]	22. Behavior change counseling [3]
3. Supplements and CAM [1,3]	8. Pediatric nutrition [1-3]	13. Nutrition assessment and support [2-4]	18. Food fads/ health food trends/ vegetarianism [2,3]	23. Nutrition and osteoporosis [1-3]
4. Heart-healthy diets [1]	9. Macro and micronutrients [2,3]	14. Nutrition and cancer [2,3]	19. Dietary sources [3]	24. D.A.S.H. diet[5]
5. Diabetes diet [1,2]	10. Diet and hypertension [2,3]	15. Criteria of an adequate diet [2,3]	20. Antioxidants [3]	25. Therapeutic Lifestyle Changes [5]

[1] Mihalynuk et al (2009). [2] Weinsier RL et al (1989). [3] Adams KM et al (2010).
[4] Block JP, DeSalvo KB, Fisher WP (2003). [5] Kelly CJ (2007).

Table 3. Foundational National Health Organizations Resourced in WBW

National Heart, Lung and Blood Institute (NHLBI)	United States Department of Agriculture (USDA)
National Institutes of Health (NIH)	Centers for Disease Control (CDC)
International Food Information Council (IFIC)	American Heart Association (AHA)
American Cancer Society (ACS)	American Diabetes Association (ADA)
Academy of Nutrition and Dietetics (AND)	Mayo Clinic

Resources including 1) obesity assessment tools; 2) dietary and physical activity guidelines and recommendations for Americans; 3) educational material on nutrition as it relates to obesity and chronic diseases; 4) reliable information and reviews on weight-loss and fad diets; 5) printable patient and physician handouts; 6) videos; 7) educational resources on nutrients for health; 8) tips for medical students and physicians on communicating with overweight and obese patients; 9) mobile health and fitness app reviews; and 10) information on dietitian's role in health care were then organized into Wix.com, a free, online website-builder. Additionally, interactive tools including links to: 1) BMI and health risk calculators; 2) USDA's SuperTracker and other interactive tools to help patients personalize their diet and fitness goals, track food and fitness activity, and receive tips and support; 3) "Assess Yourself" tools; and 4) short quizzes to test nutrition and obesity knowledge were organized into the website.

4.1.2 Development of Pretest and Posttest Evaluation Surveys

To evaluate the research objective, question, and hypotheses for this study and effectiveness of the WBW for medical students, I created a 53-question pretest survey (PS) and a 64-question posttest evaluation survey (PES) using Qualtrics® Survey Application, a free survey builder, provided through TAMU Informational Technology. The purpose of the PS is to assess TAMHSC COM students' degree of nutrition coursework and/or training prior to the WBW, baseline attitudes towards nutrition, defined as medical students' feelings toward the role of nutrition in patient care and their role in providing nutrition and obesity education to their patients, perceived self-efficacy, defined by the degree of confidence medical students have in delivering

nutrition and obesity education to overweight and obese patients, and nutrition and obesity knowledge, defined by the ability of medical students to correctly answer the survey questions on 1) BMI and waist circumference, 2) dietary and physical activity guidelines, 3) good food sources for macronutrients and micronutrients, and 4) dietary recommendations for reducing risk of chronic disease, before the intervention. The purpose of the PES is to assess changes in nutrition attitudes, perceived self-efficacy, nutrition and obesity knowledge, and to achieve viable feedback on the content, layout, resources, accessibility, overall value, and recommendations for improving the WBW, after accessing the WBW tools and resources.

The survey development stage took approximately four months from start to finish, and began with gathering research literature on nutrition and medical survey questionnaires for medical students and related health professionals. Keywords used in online database search boxes are outlined in Table 4.

Table 4. Keywords for Searching Online Databases for Survey Development

Survey	Medical	Nutrition	Knowledge
Evaluation	Education	Perception	Attitudes
Physician	Medical students	Questionnaire	

The PS and PES were adapted from an assembly of literature by McGaghie [26], Park [27], Feren [28], Parmenter [29], and Niederhauser [30]. A large pool of questions

were generated, and through a series of meetings the final surveys were condensed into 53 (PS) and 64 (PES) questions organized in 4 (PS) and 5 (PES) categories: Screening and Demographics; Nutrition Attitudes; Perceived Self-Efficacy; Nutrition and Obesity Knowledge; and Web-Based Workshop Content (PES only). The two surveys consisted of multiple-choice (MC), fill-in-the-blank (FIB), Likert-scale (LS), and agree/disagree (A/D) questions. The content of the PS included one MC screening question (1), seven FIB and MC demographic questions (2-8), eight LS questions on nutrition attitudes (9-16), seven LS questions on perceived self-efficacy (17-23), and a 30-question MC and A/D nutrition and obesity knowledge test (24-53). The PES is an exact replica of the PS with the addition of eight LS and three open-ended WBW content questions (24-34) including medical students' views of the WBW pilot, their experiences while navigating the WBW, and recommendations for improving the WBW for future study. The WBW content questions from the PES were developed to evaluate the quality of the WBW tools and resources and the value of the WBW to medical students' education, as well as to revise the WBW in a way that best meets the needs of TAMHSC COM students. See Tables 5 and 6.

Table 5. Pretest Survey Organizational Outline (number of questions)

I. Screening and Demographics (1-8)
II. Nutrition Attitudes (9-16)
III. Perceived Self-Efficacy (17-23)
IV. Nutrition and Obesity Knowledge Test (24-53)

Table 6. Posttest Evaluation Survey Organizational Outline (number of questions)

I. Screening and Demographics (1-8)
II. Nutrition Attitudes (9-16)
III. Perceived Self-Efficacy (17-23)
IV. *Web-Based Workshop Content (24-34)*
V. Nutrition and Obesity Knowledge Test (35-64)

Before incorporating the PS and PES into the WBW, the two surveys were pilot-tested for question clarity, length of time spent on each survey, and overall impression of survey length with five graduate students. It took the five respondents 7-15 minutes to complete the PS and 6-13 minutes to complete the PES; the questions were reported as "clear", and the length of time to take the surveys was reported as "neither too long, nor too short". The final drafts of the PS and PES are included in Appendix E and F respectively.

4.1.3 Focus Group and Development of Focus Group Questions

On Monday, November 18, 2013, a focus group was conducted after the initial development of the WBW to evaluate the resources, layout, organization, and overall design of the WBW. Results from the focus group were used to make recommendations for revision to the entire WBW before the pilot test was convened. The focus group consisted of members of the local (Bryan/College Station) medical community: 1) one registered dietitian currently working in the clinical setting; 2) four TAMHSC COM students; and 3) one graduate student each from the Department of Nutrition and Food Science and Department of Health and Kinesiology; totaling 7 participants. We were unable to have a physician in attendance, and the TAMHSC faculty representative was unable to attend last minute. However, the TAMHSC faculty representative responded to the focus group questions by email and that data was used in our analysis. We were unable to receive physician responses.

In order to organize and moderate a successful focus group and develop effective questions, resources utilized included a book on focus groups for applied research by Richard A. Krueger [31], the NOAA Coastal Services Center [32], and Cote-Arsenault and Morrison-Beedy [33]. Additionally, we reached out to Texas A&M AgriLife focus group expert, Sharon Robinson for her expertise in focus group meeting preparation and question development. Through a series of meetings we developed a large pool of focus group questions that were eventually condensed down to twelve questions. The first five questions were specific to the future webinar and the remaining five were specific to the WBW. The last two questions were summary questions. Focus group questions 6-10

(Appendix D) were used to analyze responses related specifically to the WBW. Materials needed for the focus group meeting included a voice recorder, video camera, whiteboard, pens and notecards for the participants, food, and beverages. A small focus group meeting was pilot tested for timing and question clarity prior to the actual meeting.

4.1.4 Focus Group Analysis and WBW Revisions

The focus group questions and participant discussion were manually transcribed into a Word document and analyzed using modified qualitative analysis techniques from Onwuegbuzie et al., 2009 [34] and Bertrand et al., 1992 [35]. Only questions 1 and 6-10 were analyzed for the purpose of making WBW revisions. Main points of discussion in response to each question during the focus group meeting were organized into tables and either received an "A" which indicated agreement or an original idea or a "D" which indicated disagreement by the participants. Revisions made to the WBW were based on the prevalence of key summary points or consensual responses made by focus group participants. Focus group questions were reported using qualitative data reporting techniques by Krueger [31].

4.2 Implementation

Targeted pilot participants for this study were TAMHSC first through fourth-year medical students. A TAMHSC COM staff representative emailed all TAMHSC COM students the link to the WBW pilot via the student listserv along with the research study information sheet and consent form. This email was sent out periodically during the three-week implementation period. When the pilot participants accessed the homepage

of the WBW, they were directed to complete the PS prior to accessing the remainder of the WBW pages and resources. TAMHSC COM students were given approximately three weeks (February 18, 2014 to March 14, 2014 to access the contents of the WBW and complete a PES. As an incentive to participate, pilot participants who accessed the WBW and completed both the PS and PES were automatically entered in to a randomly selected drawing for the chance to win one of four $25 Amazon.com gift cards.

4.3 Statistical Evaluation

We conducted a repeated cross-section design study to evaluate medical students' change in nutrition attitudes, defined as medical students' feelings toward the role of nutrition in patient care and their role in providing nutrition and obesity education to their patients, change in perceived self-efficacy, defined by the degree of confidence medical students have in delivering nutrition and obesity education to overweight and obese patients, and change nutrition and obesity knowledge, defined by the ability of medical students to correctly answer the nutrition and obesity knowledge survey questions. The software used to analyze the PS and PES data was IBM® SPSS Statistics Version 22®. Ten PES subjects and their responses were paired with their corresponding PS responses by IP number, age, height, weight, and current year in medical school. Paired samples t-tests were performed for the 10 paired PS and PES respondents. If a question presented had more than one possible answer, each of that question's answers were coded with a "0" for "Did not endorse" or a "1" for "Endorsed". All "Missing" data (non-responses) were coded with a 99 so that they would be excluded from the analysis. Data that were considered "Not applicable" (i.e. Respondents who reported no prior

nutrition training did not answer the following question regarding type of nutrition training received) were coded with an 88 and these responses were also excluded from the analysis.

4.3.1 Demographics

For both the PS and PES, frequencies analysis was performed on gender, year of medical school currently completing, and prior nutrition training or coursework. Descriptive analysis (mean, min, max, and std. deviation) was performed on age, height in inches, and weight in pounds. BMI was also calculated (weight in lbs/height in $inches^2$ * 703).

4.3.2 Nutrition Attitudes

Prior to analysis, two questions that were stated negatively were "reverse-scored" (5 changed to 1, 4 changed to 2, etc). Descriptive and frequencies analysis was performed for each of the "nutrition attitudes" questions to evaluate the most common answers. Paired two-tailed t-tests were also performed for each "nutrition attitudes" question (PS and PES 9-16) and for the total "nutrition attitudes" score to compare the responses from the two surveys. The total "nutrition attitudes" score was created by calculating the sum of the responses for each subscale combined score (1=Strongly Disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Disagree).

4.3.3 Perceived Self-Efficacy

Descriptive and frequencies analysis was performed for each of the "perceived self-efficacy" questions to evaluate the most common answers. Paired two-tailed t-tests were also performed for each "perceived self-efficacy" question (PS and PES 17-23) and

for the total “perceived self-efficacy” score to compare the responses from the two surveys. The total “perceived self-efficacy” score was created by calculating the sum of the responses for each subscale combined score (1=Strongly Disagree; 2=Disagree; 3=Neither agree nor disagree; 4=Agree; 5=Disagree).

4.3.4 Nutrition and Obesity Knowledge

Prior to analysis, each knowledge response items were coded as either “correct” or “not correct”. Descriptive and frequencies analysis was performed for each of the “nutrition and obesity knowledge” questions to evaluate the most common answers. Paired two-tailed t-tests were also performed for each of the “nutrition and obesity knowledge” questions (PS 24-53 and PES 35-64). The total knowledge scores were given a grade based on correct responses by calculating the sum of the correct and not correct responses for all 29 “nutrition and obesity knowledge” questions.

4.3.5 Web-Based Workshop Content

Frequencies analysis (mode) was performed for each of the Likert-scale “web-based workshop content” questions (PES 24-34). The three fill-in-the blank questions were qualitatively considered for future revisions to the WBW.

5. RESULTS

5.1 Focus Group

Seven out of nine invited participants were in attendance at the focus group meeting, one RD, four TAMHSC COM students, one NUTR graduate student representative, and one HLKN graduate student representative. The TAMHSC COM faculty representative was unable to attend, but sent her responses to the FG questions via email. Results from each of these eight participant responses were analyzed. Our local physician was unable to attend and their responses to the FG questions were not obtained. Tables 7- outline the qualitative data gathered from the FG discussion. Questions 1 and 6-10 were analyzed because these questions were specific to improving and making revisions to the WBW prior to the pilot test. The following six tables are organized with the predetermined question at the top of the table, the main points made during the discussion of that question directly underneath on the following row, and the FG participants listed on the left side of the table. In developing analysis tables of the FG discussion results, the letter "A" represents an original idea that developed into a main summary point of the discussion. If an original idea or agreement was agreed upon by another participant, this agreement was represented by the addition of another letter "A" (i.e. AA=two agreements or an original idea plus one agreement). If a participant expressed disagreement toward a main point, the letter "D" represented their disagreement response within the analysis table.

When FG participants were asked what they feel is the most serious health concern facing healthcare professionals today, most participants agreed that obesity was a major health concern (Table 7). Additionally, factors such as healthcare professionals' lack of nutrition knowledge and low self-confidence in providing nutrition and physical activity recommendations to patients were also of concern. Furthermore, a consensus of medical students believe that the focus on curative rather than preventative medicine within their medical school curriculum is a serious issue, and our participating RD indicated that the lack of access to medical care and health insurance are major concerns facing healthcare professionals in the United States today.

Table 7. Focus Group Question 1 Results (N=8 respondents)

Question 1: What do you feel is the most serious health concern facing health care professionals in the United States today?						
Main Points	Obesity and the prevalence of taking shortcuts to lose weight	Physical inactivity	Lack of access to medical care and health insurance coverage	Lack of physician knowledge in nutrition	Curative versus preventative medicine	Obesity and mental health
Physician						
Faculty Rep	A					A
RD	A	A	A			
Medical Students			A	AA	AAA	
Nutrition	A					
Kinesiology		A				
A=Original idea/agreement; AA=2 agreements; AAA=3 agreements; AAAA=4 agreements; D=Disagree						

When asked about the quality and quantity of the *content* provided in the WBW there was agreement that the WBW provides easy access to good comprehensive nutrition and obesity-related information and resources (Table 8). However, most also

felt that there was too much content within the WBW to learn in a restricted period of time. Furthermore, our medical student participants felt that at that specific point in their education (2nd year, not currently seeing patients), the WBW is not valuable enough to optionally pay for.

Table 8. Focus Group Question 6 Results (N=8 respondents)

Question 6: After viewing the workshop, what are your thoughts on the *amount* and *quality* of the resources provided?							
Main Points	WBW provided inclusive information; but too much to absorb at a time	Good information resource	Lecture style preferred for learning	If optional, I would not pay for these resources	I do not currently need these resources	Liked self-quizzes	Good quality multimedia are useful
Physician							
Faculty Rep							A
RD							
Medical Students	AA	AA	A	AAAA	AA	A	
Nutrition							
Kinesiology							
A=Original idea/agreement; AA=2 agreements; AAA=3 agreements; AAAA=4 agreements; D=Disagree							

When asked what they would like to see more or less of in regards to WBW content, FG participants recommended the inclusion of case studies, quality multimedia, research literature, current bariatric resources, and mobile apps (Table 9). Due to time and resource restraints, supplemental case studies were not incorporated into the pilot. There was prolonged debate on including the Harvard Plate Method in addition to USDA's MyPlate. The Harvard Plate Method was not included due to overwhelming disagreement and concern over excessive and confusing information.

Table 9. Focus Group Question 7 Results (N=8 respondents)

Question 7: In regards to the *content*, please finish this sentence: I would like to see more or less of							
Main Points	Include technology support (apps)	Include current resources on bariatric surgery	Liked self-quizzes	Good quality multimedia are useful	Include links to scientific databases and clinical research literature	Include case studies. WBW is useful if relevant to clinical cases	Compare Harvard Plate Method to the USDA MyPlate
Physician							
Faculty Rep				A	A	A	D
RD		A					
Medical Students			A				A
Nutrition							
Kinesiology	A						
A=Original idea/agreement; AA=2 agreements; AAA=3 agreements; AAAA=4 agreements; D=Disagree							

Regarding design, layout and organization of the WBW, FG participants liked the overall design and organization of the WBW. One recommendation was made to make the graphs easier to read or allow the user to click on the visual to enlarge the graph (Table 10). Other recommendations were to make the font easier to read and provide a paragraph or sentence explaining the content of the linked resources. Additional suggestions from our faculty representative were to include learning objectives on the homepage, reformat the navigation panel, provide brief descriptions of the topics and tie in biochemistry and upper-level educational resources to the "Nutrition and Diet" and "Nutrition in Health and Disease" pages. Each of these recommendations were taken into consideration and applied to the WBW revision phase.

Table 10. Focus Group Question 8 Results (N=8 respondents)

Question 8: What are your thoughts on the design, layout and organization of the workshop webpage?						
Main Points	Clean Design and organization	Lag-time when selecting links and changing pages.	Hard-to-read font.	Give an idea of the purpose of the links.	Made the citations less distracting and more condensed.	Make the graphics easier to view
Physician						
Faculty Rep	A	A		A		A
RD						A
Medical Students	A		A	AA	A	AA
Nutrition						
Kinesiology						
A=Original idea/agreement; AA=2 agreements; AAA=3 agreements; AAAA=4 agreements; D=Disagree						

When FG participants were asked what they would change about the WBW or do differently (Table 11), summary responses included 1) adding unbiased scientific research literature related to the nutrition and obesity resources, 2) providing research evidence on whole foods versus dietary supplements, 3) incorporating supplementary case studies at the beginning of the workshop, 4) giving an overview of obesity as a major health concern, 5) including more patient handouts, 6) giving more attention to physical activity, and 7) incorporating more short (>15 minute) videos. Except for the case studies, all of the above recommendations were included into the WBW. There was a prolonged debate on the amount of information included in the WBW. Many agreed that the abundant amount of resources was necessary to comprehensively cover the multi-dimensions of nutrition and obesity, however, others desired to see more "distilled" or condensed resources that provided more "at-a-glance" types of educational information. One of the other larger debates was whether to include the metabolic

mechanisms to support dietary and physical activity recommendations for health and disease prevention.

Table 11. Focus Group Question 9 Results (N=8 respondents)

Question 9: Suppose you were responsible for putting together this workshop for medical students. What would you change or do differently?										
Main Points	Include patient case studies	Overview of obesity as a major health concern	Condense the information	Unbiased, reliable information resources	Dietitian services	Short Videos	Include patient handouts on exercise	Include more exercise components	Include mechanisms of metabolism	Difference between supplement and whole foods
Physician										
Faculty Rep	A	A								
RD					A		A			
Medical Students			AA	A	A	AAA		A	AAA	A
Nutrition								A		
Kinesiology							A	A		
A=Original idea/agreement; AA=2 agreements; AAA=3 agreements; AAAA=4 agreements; D=Disagree										

When asked how our FG participants would implement this pilot, the main points that were made were to contact medical school faculty and integrate the WBW content into relevant course blocks or to implement the WBW as a two-week elective course (Table 12). The consensus among the medical students and medical school faculty representative was that mandatory participation and a grading component should be required.

Table 12. Focus Group Question 10 Results (N=8 respondents)

Question 10: If you were in charge of pilot testing this workshop, how would you go about implementing this project to medical students and why?					
Main Points	Introduce the workshop to faculty and incorporate material into their lectures.	Ask block leaders to introduce students to the workshop in expectations of completing the workshop.	Mandatory participation.	Incorporate into a separate elective or nutrition class with a grading component.	Implement the workshop as a mandatory one-day event.
Physician					
Faculty Rep	A	A	AA	A	
RD					
Medical Students	AAA			AAA	AAA
Nutrition					
Kinesiology	A				
A=Original idea/agreement; AA=2 agreements; AAA=3 agreements; AAAA=4 agreements; D=Disagree					

5.2 Pretest Survey and Posttest Evaluation Survey Results

During the three-week data collection period 33 COM students accessed the WBW pretest survey (PS) and 11 COM students accessed the posttest evaluation survey (PES). The completion rate of the entire PS was 84.8% (N=28) and the completion rate for the PES was 100% (N=11). One student dropped out of the PS before completing the "demographics" section and two more students did not complete the nutrition and obesity knowledge (NKQ) section of the PS. The completion rate for each section of the PS and PES are shown below in Table 13.

Table 13: PS and PES Completion Rate

	PS	PES
	N (%)	N (%)
Screening	33 (100)	11 (100)
Demographics	32 (97.0)	11 (100)
Nutrition Attitudes (NAQ)	30 (90.9)	11 (100)
Perceived Self-Efficacy (PSEQ)	30 (90.9)	11 (100)
WBW Content (WBWQ)		11 (100)
Nutrition and Obesity Knowledge Test (NKQ)	28 (84.8)	11 (100)

5.2.1 Screening and Demographics

Out of 32 COM student respondents who completed the PS demographics section, 19 (59.4%) were female and 13 (40.6%) were male, 4 (12.5%) were 1st-year COM students, 11 (34.4%) were 2nd-year, 7 (21.9%) were 3rd-year and 10 (31.3%) were 4th-year students. Out of the 11 PES respondents, 4 (36.4%) were female and 7 (63.6%) were male, 2 (18.2%) were 1st-year COM students, 3 (36.4%) were 2nd-year, 2 (18.2%) were 3rd-year and 3 (27.3%) were 4th-year students. BMI was calculated for each participant in each survey using their reported weight and height and categorized by underweight (BMI <18.5); normal weight (BMI=18.5-24.9); overweight (BMI=25.0-29.9); or obese (BMI >30). Mean BMI was for PS and PES respondents was 23.09 and 24.43 respectively. Demographic characteristics of TAMHS COM students who responded to the PS and PES are summarized in Table 14. Greater than half of the COM student respondents (54.5%) reported having no nutrition training prior to the WBW in

the PS, and out of the 14 respondents (42.4%) that did report having nutrition coursework or training, 10 (71.4%) reported taking at least one undergraduate course in nutrition, 5 (35.7%) reported taking a required nutrition course in medical school, 2 (14.3%) reported taking an elective nutrition course in medical school and one student (7.1%) reported attending one to two nutrition lectures during medical school.

Table 14. Demographic Characteristics of TAMHSC COM Students Who Responded To the PS and PES

Survey Participant Characteristics		Pretest Survey (PS)	Posttest Evaluation Survey (PES)	Paired PS and PES
		N (%)	N (%)	N (%)
Gender		32 (100)	11 (100)	10 (100)
	Male	13 (40.6)	7 (63.6)	6 (60)
	Female	19 (59.4)	4 (36.4)	4 (40)
Age in years				
	22-24	12 (37.5)	3 (27.3)	3 (30)
	25-27	14 (43.8)	6 (54.5)	5 (50)
	28-30	4 (12.5)	1 (9.1)	1 (10)
	>30	2 (6.3)	1 (9.1)	1 (10)
BMI				
	Underweight	3 (9.4)	0 (0)	0 (0)
	Normal	18 (56.3)	5 (45.5)	5 (50)
	Overweight	10 (31.3)	6 (54.5)	5 (50)

	Table 14 continued Survey Participant Characteristics	Pretest Survey (PS)	Posttest Evaluation Survey (PES)	Paired PS and PES
	Obese	1 (3.1)	0 (0)	0 (0)
Current Year in Medical School				
	1st	4 (12.5)	2 (18.2)	2 (20)
	2nd	11 (34.4)	4 (36.4)	3 (30)
	3rd	7 (21.9)	2 (18.2)	2 (20)
	4th	10 (31.3)	3 (27.3)	3 (30)
Prior nutrition coursework or training				
	No	18 (56.0)	6 (54.5)	4 (40)
	Yes	14 (44.0)	5 (45.5)	6 (60)
If Yes, what prior nutrition coursework or training				
	At least 1 undergraduate class	10 (71.4)	4 (66.7)	4 (66.7)
	Nutrition major in college	0 (0)	0 (0)	0 (0)
	Masters in nutrition	0 (0)	0 (0)	0 (0)
	Required nutrition course in medical school	5 (65.7)	2 (18.2)	2 (33.3)
	Elective nutrition course in medical school	2 (14.3)	0 (0)	0 (0)
	Other: 1-2 Nutrition lectures during M2 year	1 (7.1)	1 (9.1)	1 (16.7)

5.2.2 Nutrition Attitudes

Tables 15 and 16 summarize the results for nutrition attitudes scores. Thirty respondents (90.9%) completed the nutrition attitudes questions (NAQ) on the PS and eleven respondents (100%) completed this section of the PES. “Nutrition attitudes” scores for each question was measured using a Likert-scale method (1=Strongly

Disagree; 2=Disagree; 3=Neither Agree nor Disagree; 4=Agree; 5=Strongly Agree). Scores for each individual question and respondent were added up and a mean sum score was calculated for the entire "nutrition attitudes" section. The maximum possible score (all respondents answer "Strongly Agree" for every question) is 40. The mean score for NAQ on the PS was 29.367 ± 2.735, N=30 and 29.273 ± 3.069, N=11 on the PES. The paired NAQ PS sum mean score was 28.9 ± 2.726 (M ± SD) and the paired NAQ PES sum mean score was 29.7 ± 3.869. Although not statistically significant (p=0.309), there was a reported increase in nutrition attitudes mean sum score between the paired NAQ PS and the NAQ PES (M ± SD, -0.80 ± 2.348). Paired samples correlation and t-test could not be computed for NAQ 9 ("A change towards a healthier lifestyle is important in any stage of life") because the standard error of the difference was "0" (i.e. there was no change between PS and PES responses).

Table 15. Nutrition Attitudes Descriptive Statistics for PS and PES

	N	Min	Max	Mean	St. Dev.
NAQ PS	30	25.00	36.00	29.37	2.74
NAQ PES	11	25.00	35.00	29.27	3.07
Paired NAQ PS	10	25.00	33.00	28.90	2.73
Paired NAQ PES	10	25.00	35.00	29.70	2.87

NAQ= Nutrition attitudes questions PS=Pretest survey PES=Posttest evaluation survey
Maximum Possible Score (all responses indicate "Strongly Agree") = 40

Table 16. Nutrition Attitudes Scores (Paired Samples Test N=10)

	M	SD	Std. Error Mean	95% Confidence Interval		t	df	p-value
				Lower	Upper			
NAQ PS	28.90	2.726	0.862					
NAQ PES	29.7	2.869	0.907					
Total Sum Score NAQ PS-NAQ PES	-0.80	2.348	0.742	-2.479	0.879	-1.08	9	0.309
Nutrition Attitudes Question (NAQ)								
NAQ9. A change towards a healthier lifestyle is important in any stage of life.[a]	4.80	0.422	0.133	-	-	-	-	-
NAQ10. Nutrition assessment and counseling should be included in any routine appointment, just like diagnosis and treatment.	-0.10	0.316	0.100	-0.326	0.126	-1.00	9	0.343
NAQ11. I have an obligation to improve the health of my patients by discussing nutrition with them.	0.00	0.471	0.149	-0.337	0.337	0.00	9	1.000
NAQ12. Most medical students are not adequately trained to discuss nutrition with patients.**	-0.20	1.033	0.327	-0.939	0.539	-0.61	9	0.555
NAQ13. Most patients will try to change their lifestyle if I advise them to do so.	-0.30	0.675	0.213	-0.783	0.183	-1.41	9	0.193
NAQ14. Specific advice about how to make dietary changes could help patients improve their eating habits.	-0.10	0.316	0.100	-0.326	0.126	-1.00	9	0.343
NAQ15. For most patients, health education does little to promote adherence to a healthy lifestyle.**	-0.20	0.789	0.249	-0.764	0.364	-0.80	9	0.443
NAQ16. It is important that I recommend dietary changes prior to initiating drug therapy whenever possible.	0.10	0.568	0.180	-0.306	0.506	0.56	9	0.591

NAQ=Nutrition Attitudes Question PS=Pretest Survey PES=Posttest Evaluation Survey
M=Mean of summed scores SD=Standard deviation
[a] The correlation and t-score cannot be computed because the standard error of the difference is 0.
**Negatively stated items were "reverse-scored" (NAQ 12 and NAQ15).
Maximum Possible Score (all responses indicate "Strongly Agree") = 40

5.2.3 Perceived Self-Efficacy

Tables 17 and 18 summarize the results for Perceived Self-Efficacy scores. Thirty respondents completed the "perceived self-efficacy" questions (PSEQ) on the PS and 11 respondents completed this section on the PES. "Perceived self-efficacy" scores for each question were measured using a Likert-scale method (1=Strongly Disagree; 2=Disagree; 3=Neither Agree nor Disagree; 4=Agree; 5=Strongly Agree). Scores for each individual question and respondent were added up and a mean sum score was calculated for the entire "perceived self-efficacy" section. The maximum possible score (all respondents answer "Strongly Agree" for every question) is 35. The mean score for PSEQ on the PS was 23.8 ± 4.937, N=30 and 26.364 ± 4.1779, N=11 on the PES. The paired sum mean scores were 23.8 ± 4.937, N=10 for the PSEQ PS and 26.4 ± 4.178, N=10 for the PSEQ PES. Although not statistically significant (p=0.161), there was an increase in perceived self-efficacy mean sum score between the paired PSEQ PS-PSEQ PES (-2.60 ± 5.379). There was a statistically significant difference between PS and PES for one individual paired question, "PSEQ23 I know where to find reliable online resources on physical activity" (-1.0 ± 1.333, p=0.042). However, there was no significance observed for the remaining paired sample PSE questions.

Table 17. Perceived Self-Efficacy Descriptive Statistics for PS and PES

	N	Min	Max	Mean	Std. Dev
PSEQ PS	30	12.00	35.00	23.80	4.94
PSEQ PES	11	17.00	33.00	26.36	4.18
Paired PSEQ PS	10	12.00	33.00	23.60	5.95
Paired PSEQ PES	10	17.00	33.00	26.20	4.37

PSEQ=Perceived Self-Efficacy PS=Pretest Survey PES=Posttest Evaluation Survey

Maximum Possible Score (all responses indicate "Strongly Agree") = 35

Table 18. Perceived Self-Efficacy Scores (Paired Samples Test N=10)

	Paired Differences					t	df	p-value
	M	SD	Std. Error Mean	Lower	Upper			
PSEQ PS	23.60	5.948	1.881					
PSEQ PES	26.20	4.367	1.381					
Sum Score PSEQ PS – PSEQ PES	-2.60	5.379	1.701	-6.448	1.248	-2	9	0.161
PSEQ17. I feel comfortable with my ability to provide nutrition education with overweight/obese patients.	-0.10	0.568	0.18	-0.506	0.306	-1	9	0.591
PSEQ18. I feel comfortable with my ability to provide physical activity education with overweight/obese patients.	-0.40	0.699	0.221	-0.9	0.1	-2	9	0.104
PSEQ19. I feel comfortable with my ability to discuss strategies for disease prevention and treatment, including nutrition and lifestyle.	-0.20	0.789	0.249	-0.764	0.364	-1	9	0.443
PSEQ20. I am likely to refer overweight/obese patients to a registered dietitian for dietary assessment and treatment.	0	0.816	0.258	-0.584	0.584	0	9	1
PSEQ21. I am likely to refer diabetic patients to a registered dietitian for dietary assessment and treatment.	0	0.816	0.258	-0.584	0.584	0	9	1
PSEQ22. I know where to find reliable online resources on general nutrition.	-0.90	1.37	0.433	-1.88	0.08	-2	9	0.068
PSEQ23. I know where to find reliable online resources on physical activity.	-1.0	1.333	0.422	-1.954	-0.05	-2	9	0.042*

PSEQ=Perceived Self-Efficacy Question PS=Pretest Survey PES=Posttest Evaluation Survey
M=Mean of summed scores SD=Standard deviation
*Significance at $p < 0.05$
Maximum Possible Score (all responses indicate "Strongly Agree") = 35

5.2.4 Nutrition and Obesity Knowledge

Tables 17 and 18 summarize the results for the "correct" nutrition and obesity knowledge scores. Correct answers to the surveys can be seen in Appendix E and F. Twenty-eight respondents (84.8%) completed the nutrition and obesity knowledge questions (NKQ) on the PS and 11 respondents (100%) completed this section of the PES. Each correctly answered question was given a score of "1" and incorrect answers were given a score of "0". All correct answer scores were summed and a mean sum correct score was calculated for the "nutrition and obesity knowledge" test. The maximum number of correct scores adds up to 47 points. The mean correct score for NKQ Grade on the PS was 31.75 ± 5.386, N=28 and 35.46 ± 5.392, N=11 on the PES. The paired NKQ Grade PS sum mean correct score was 32.4 ± 5.232, N=10 and 36.0 ± 5.354, N=10 for the paired NKQ Grade PES. Although not statistically significant (p=0.068), there was a reported increase in nutrition and obesity knowledge sum mean correct score between the paired NKQ Grade PS and the NKQ Grade PES (-3.6 ± 5.501). According to the paired samples t-test, there was significant change between PS and PES for NKQ 28 "Intake of less than___mg of cholesterol is recommended for a healthful diet" (M ± SD, p-value<0.05; -0.4 ± 0.516, p=.037). Paired samples correlation and t-test could not be computed for NKQ 30_3, NKQ 34, NKQ 36_1, NKQ 36_5, NKQ 40-42, NKQ45 and 45 a., NKQ 47, and NKQ53 because the standard error of the difference was "0" (i.e. there was no change between PS and PES responses).

Table 19. Nutrition and Obesity Knowledge Descriptive Statistics for PS and PES

	N	Min (%)	Max (%)	Mean (%)	Std. Dev
NKQ Grade PS	28	19 (40.4)	40 (85.1)	31.75 (67.6)	5.39
NKQ Grade PES	11	27 (67.5)	44 (93.6)	35.45 (73.3)	5.39
Paired NKQ Grade PS	10	22 (46.8)	38 (80.9)	32.4 (68.9)	5.23
Paired NKQ Grade PES	10	27 (67.4)	44 (93.6)	36.0 (76.6)	5.35
NKQ=Nutrition and Obesity Knowledge Question PS=Pretest Survey PES=Posttest Evaluation Survey Maximum Possible Score (all responses answered correctly)= 47					

Table 20. Nutrition and Obesity Knowledge Scores (Paired Samples Test N=10)

		Paired Differences					t	df	p-value	Correlation	Sig.
		M	SD	Std. Error Mean	95% Confidence Interval						
					Lower	Upper					
SD is a 50 year-old woman who wants to reduce her caloric intake enough to lose 1 pound per week. By how many calories must she reduce her intake each day to achieve her goal?		-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.667	0.035
How many grams of carbohydrates are required for normal brain function?		-0.3	0.675	0.213	-0.783	0.183	-1.406	9	0.193	0.089	0.807
What is the current minimum recommendation for physical activity?		-0.3	0.483	0.153	-0.646	0.046	-1.964	9	0.081	0.535	0.111
Less than what percent of trans fats is recommended by the Dietary Guidelines for Americans?		0.1	0.568	0.18	-0.306	0.506	0.557	9	0.591	0.408	0.242
Intake of less than___mg of cholesterol is recommended for a healthful diet.		-0.4	0.516	0.163	-0.769	-0.031	-2.449	9	0.037*	0.333	0.347
Which dietary factor is not correlated with the prevention of cardiovascular disease?		-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.667	0.035
Energy is provided by the oxidation of dietary protein, fat, carbohydrate, and alcohol. How many calories are in a gram of each nutrient?											
	Protein	-0.2	0.422	0.133	-0.502	0.102	-1.5	9	0.168	0.612	0.06
	Fat	-0.2	0.422	0.133	-0.502	0.102	-1.5	9	0.168	0.509	0.133
	Carbohydrate [a]	-	0.422	0.133	-	-	-	-	-	-	-
Metabolism of 150g carbohydrate, 20g fat, and 10g protein yields approximately how many kilocalories?		-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.764	0.01
The food that contains the highest amount of carbohydrate is ___.		0	0.471	0.149	-0.337	0.337	0	9	1	0.375	0.286

Table 20 continued

		Paired Differences					t	df	p-value	Correlation	Sig.
		M	SD	Std. Error Mean	95% Confidence Interval						
					Lower	Upper					
The food that contains the highest amount of fat is ___.		-0.1	0.568	0.18	-0.506	0.306	-0.557	9	0.591	0.218	0.545
The mineral that decreases the risk of hypertension is ____.[a]		-	0.527	0.167	-	-	-	-	-	-	-
Intake of which dietary components may reduce a patient's risk of developing obesity-related chronic diseases? Select all that apply.											
	Refined carbohydrates (incorrect)	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	.	.
	Vegetables (correct)	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	.	.
	Whole grains (correct)	-0.2	0.422	0.133	-0.502	0.102	-1.5	9	0.168	0.509	0.133
	Saturated fat (incorrect)	0	0.471	0.149	-0.337	0.337	0	9	1	-0.111	0.76
	Monounsaturated fat (correct)	-0.1	0.568	0.18	-0.506	0.306	-0.557	9	0.591	0.356	0.312
	Salt (incorrect)	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	.	.
	Whole fruit (correct)	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	.	.
What contributes to the greatest intake of sodium in the typical American diet? Choose all that apply.											
	Adding salt to food (incorrect)[a]	-	0.483	0.153	-	-	-	-	-		0.01
	Breads and rolls (correct)	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.764	0.01
	Sandwich meats (correct)	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.764	0.01

Table 20 continued

		Paired Differences					t	df	p-value	Correlation	Sig.
		M	SD	Std. Error Mean	95% Confidence Interval						
					Lower	Upper					
	Vinegar (incorrect) [a]	-	0	0	-	-	-	-	-	-	-
	Ready-made sauces and dips (correct)	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.764	.
	Baked potatoes (incorrect)	0.1	0.316	0.1	-0.126	0.326	1	9	0.343	.	0.035
	Canned soups (correct)	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.667	0.645
Replacing saturated fats with unsaturated fats may reduce the risk of chronic metabolic diseases. All of the follow foods are considered good sources of unsaturated fats except?		-	0	0	-	-	-	-	-	-	-
Regularly consuming fatty fish, rich in omega-3 fatty acids, help to reduce hyperlipidemia.		-	0.316	0.1	-	-	-	-	-	-	-
Fruit should not be consumed by diabetic patients.		0.1	0.568	0.18	-0.306	0.506	0.557	9	0.591	-0.167	0.545
Starch foods such as bread, noodles, and rice should be monitored in diabetic patients. [a]		-	0	0	-	-	-	-	-	-	-
Only carbohydrates should be restricted in diabetic patients. [a]		-	0	0	-	-	-	-	-	-	-
Sodium does not have to be restricted for diabetic patients. [a]		-	0	0	-	-	-	-	-	-	-
Carbohydrates such as bread, potatoes and noodles are fattening.		-0.1	0.568	0.18	-0.506	0.306	-0.557	9	0.591	0.218	.
Which strategy yields the safest and most effective results in long-term weight loss?		-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	.	
AM is a 54-year-old postmenopausal woman who wants to lose weight. She is 5'6" (168cm) and weighs 190lb (86.4kg). What is her BMI? [a]		0.9	0.316	0.1	-	-	-	-	-	-	-

Table 20 continued

	Paired Differences					t	df	p-value	Correlation	Sig.
	M	SD	Std. Error Mean	95% Confidence Interval						
				Lower	Upper					
AM's BMI suggests she is classified as ___ [a]	0.9	0.316	0.1	-	-	-	-	-	-	-
Waist-to-hip ratio measures health risk based on weight distribution in certain parts of the body. What is the minimum ratio that indicates heightened risk for heart attack, stroke, type II diabetes, and hypertension?	-0.3	0.483	0.153	-0.646	0.046	-1.964	9	0.081	0.5	0.141
Which of the following medical conditions are associated with obesity?*	-	0	0	-	-	-	-	-		
What is the recommended diet for diabetic patients?	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.802	0.005
An obese 45-year-old adult has blood cholesterol level of 239 mg/dL. Which of the following dietary therapy is the first recommended?	-0.3	0.483	0.153	-0.646	0.046	-1.964	9	0.081	0.535	0.111
Which is recommended to supply essential fatty acids and lipid-soluble vitamins when trying to lose body weight?	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.667	0.035
___ is not related with upper body obesity.	-0.1	0.316	0.1	-0.326	0.126	-1	9	0.343	0.764	0.01
There are more complications, such as hypertension and diabetes, associated with upper body obesity than lower body obesity.	0.1	0.316	0.1	-0.126	0.326	1	9	0.343	0.802	0.005
Trans fats such as margarine are good substitutions for butter in patients with cardiovascular disease. [a]	-	0.422	0.133	-	-	-	-	-	-	-

M=Mean of summed scores SD=Standard deviation
[a] The correlation and t-score cannot be computed because the standard error of the difference is 0.
*Significance at p-value <0.05
Maximum Possible Score (all responses answered correctly)= 47

5.2.5 Web-Based Workshop Content

Results of the WBW content questions from the PES are summarized in Tables 21 and 22. Table 21 shows the frequencies of the 11 medical student respondents' reported views of the WBW content. Six out of eight WBW content questions were viewed with agreement (Mode=4; 4="Agree"). Only one question (WBWQ31. "I would likely pay a quarterly fee to access the Web-Based Workshop") was most commonly viewed with strong disagreement (Mode=1; 1="Strongly Disagree"). No one reported experiencing any technical problems while navigating the WBW. Open-ended responses to questions WBWQ33 ("What resources currently not available on the Web-Based Workshop would you like to see added?") and WBWQ34 ("Please provide us with other feedback to improve the Web-Based Workshop for medical students") are listed in Table 22.

Table 21. Web-Based Workshop Content Question Characteristics

	Frequencies					Sum [b]	Mode [c]
	Strongly Disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly Agree (5)		
WBW Content Questions	N (%)	N (%)	N (%)	N (%)	N (%)		
WBWQ24. The Web-Based Workshop enhanced my knowledge of the relationship between diet and the prevention and treatment of obesity and chronic disease.	0 (0)	0 (0)	0 (0)	11 (100)	0 (0)	44	4
WBWQ25. The resources provided were of the highest quality.	0 (0)	0 (0)	1 (9.1)	7 (63.6)	3 (27.3)	46	4
WBWQ26. The resources provided were the most applicable to medical students.	0 (0)	0 (0)	4 (36.4)	7 (63.6)	0 (0)	40	4
WBWQ27. I prefer a self-paced, self-directed, web-based workshop to a traditional, face-to-face, lecture course in nutrition.	0 (0)	2 (18.2)	3 (27.3)	4 (36.4)	2 (18.2)	39	4
WBWQ28. The design, layout and components of the Web-Based Workshop were accessible and easy to navigate.	1 (9.1)	0 (0)	2 (18.2)	7 (63.6)	1 (9.1)	40	4
WBWQ29. In the future, I will likely utilize the resources provided in the Web-Based Workshop.	0 (0)	0 (0)	6 (54.5)	4 (36.4)	1 (9.1)	39	3
WBWQ30. I will recommend this Web-Based Workshop to other COM students.	0 (0)	0 (0)	3 (27.3)	8 (72.7)	0 (0)	41	4
WBWQ31. I would likely pay a quarterly fee to access the Web-Based Workshop.	7 (63.6)	4 (36.4)	0 (0)	0 (0)	0 (0)	15	1
		N (%)					
WBWQ32. Did you experience any technical problems while accessing the Web-Based Workshop?	Yes	0 (0)					
WBWQ=Web-Based Workshop Question	No	11 (100)					

[b] The maximum sum if participant responds to all questions with "Strongly Agree" equals 5. [c]The maximum mode if participants respond with "Strongly Agree" to the majority of questions equals 5.

Table 22. Responses to WBW Content Questions (open-ended)

WBW Content Questions	
WBWQ33. What resources currently not available on the Web-Based Workshop would you like to see added?	1. Healthy international food options to recommend for adding variety into a diet. 2. More information on giving practical dietary advice to patients (i.e. "replace whole milk with 2% milk") rather than detailed recommendations (i.e. "eat 60 grams of protein"). 3. Have a short summary handout available for each section on the website. 4. None
WBW34Q. Please provide us with other feedback to improve the Web-Based Workshop for medical students.	1. Provide a set of specific expectations for utilizing the WBW. 2. "Found the organization to be a bit cumbersome - it is great to have so many resources from other websites, but I had to go to multiple other websites to get information. I think a shorter summary should be provided in the WBW with additional details in the links." 3. "I would like to see expansion of the portion control size with a larger variety of foods on the list and should include proteins, carbs, etc." 4. "Very good. Good reference." 5. "It would be nice if you could narrow down the resources presented on different topics into the bare basics and the more in depth articles and websites. Sometimes seeing several articles on the same thing seems overwhelming and I don't feel like clicking on any. I'm also lazy." 6. "Fewer links to go to external sites. Include the relevant information on the WBW page." 7. "It's a great resource, but medical students are poor and information isn't hard to find on the internet. It's nice to have everything compiled in one place, but speaking for myself I doubt that I would pay for the convenience." 8. "The page was overwhelming, most medical students aren't interested in nutrition and do not even understand why they need it in their education so a structured class teaching rather than self-paced webinar that they can click through leisurely would probably be better received."
WBWQ=Web-Based Workshop Question	

6. DISCUSSION

Obesity is a growing concern facing heath care professionals today. Six out of the ten leading causes of death in the United States are chronic diseases where obesity and dietary factors have been linked to the prevalence of these disease states [1]. In one study, although physicians are considered the number-one source of diet and weight-related information by the majority of their patients [4], they are not adequately acknowledging these issues in routine patient care [5]. The need for and lack of nutrition training in medical school and the barriers to integrating nutrition into the curriculum have generated a vital need for the development of web-based nutrition training for medical students. Therefore, the purpose of this study was to develop and pilot-test a web-based workshop that provides medical students at Texas A&M University Health Science Center with nutrition and obesity education tools and resources. The goals of this study were to increase medical students' attitudes towards the role of nutrition in medicine and their role in providing nutrition and obesity education to their patients, perceived self-efficacy in delivering nutrition and obesity education to their patients, and nutrition and obesity knowledge; and to also receive sufficient feedback to help revise and improve the WBW for future work. A pretest survey and posttest evaluation survey were developed to evaluate these expected outcomes.

6.1 Focus Group

A focus group was convened for the purpose of providing constructive feedback on the WBW before implementation. Qualitative results from the focus group discussion were used to improve and revise the WBW prior to the pilot test. Subsequent

revisions applied to the WBW included changing font style, colors and sizes into easier-to-read formats, incorporating additional research literature, excluding redundant or repeated resources, reformatting the "Home" page with objectives for the WBW and a more visually appealing navigation pane, incorporating brief topic descriptions, metabolic resources, short videos, and additional patient/physician handouts. An overwhelming need that emerged from the focus group discussion was to include clinical case studies to supplement the resources in the WBW. Unfortunately, we were unable to develop and incorporate supplemental case studies and have them approved by the IRB in time to pilot the WBW. A report of main points made during the focus group discussion, using Krueger's focus group data reporting technique [31], are as follows.

- What was *known* and then *confirmed* by the focus group?
    - Obesity is a major health concern for health professionals in America.
    - Medical students do not feel adequately trained in nutrition education.
    - One major concern with the medical school curriculum is the overwhelming emphasis on curative rather than preventative medicine.
    - The WBW is a great source of comprehensive information on nutrition, obesity and chronic disease prevention and treatment through lifestyle modifications.
- What was *suspected* and then *confirmed* or *challenged* by this focus group?
    - The WBW encompasses an over-abundant amount of information that would make learning difficult in a specified time period.

- The abundant amount of information is necessary to comprehensively cover the fundamentals of nutrition education and obesity/chronic disease prevention and treatment.
- Case studies would be beneficial for applying the content inside the WBW to medical school courses and medical practice.
- At this stage in their education (not seeing regular patients), medical students would likely not pay for access to the WBW resources if it were optional.
- Making the WBW mandatory (either by offering it as a nutrition elective or incorporating it into various course lectures) and including a grading component would increase the likelihood of access and evaluation of the WBW.

- What was *new* that was *not previously suspected*?
  - Short videos (< 15 minutes) are preferred sources for quick learning of a specific topic.
  - FG participants want to see how the resources tie into (or supplement) biochemistry, metabolism, and other courses already required in the medical school curriculum.
  - There was a tendency for the medical students to overtake the discussion. The nutrition and kinesiology students did not engage in much of the discussion, especially with the more specific questions.

6.2 Pilot Test Participation

The pilot test participation exceeded what was originally specified in our short-term outcome goals (see Appendix A). Although an anticipated posttest evaluation survey (PES) respondent rate was not specified, compared to the number of posttest surveys (PS) completed, the PES respondent rate was too low to observe any statistical significance. There were several occurrences that may have influenced the respondent rate of the PES. First, the second week of student access to the WBW coincided with TAMHSC COM testing schedules. Next, we experienced unexpected difficulties in resending the recruitment email, 3rd and 4th –year COM students are currently in their clinical rotations and finally, the last week of access to the WBW for data collection fell during spring break.

6.3 Survey Results

The pretest survey and posttest evaluation survey were developed to evaluate prior nutrition training, before the WBW, and change in nutrition attitudes, perceived self-efficacy and nutrition and obesity knowledge after accessing the WBW. Over half of the PS-only respondents reported receiving no prior nutrition training before the WBW (56%). However, only 40% of the paired respondents reported no prior nutrition training. Those who had reported receiving nutrition training had most often taken at least one undergraduate nutrition class. There was not statistically significant change in nutrition attitude scores from PS to PES. We did observe an increase in mean sum scores (-0.80 ± 2.348; p-value=0.309) for nutrition attitudes in the paired respondents (N=10), suggesting that with an increase in PES respondent rates, we may see a more significant

difference in results. Although there was no statistical significance in perceived self-efficacy change, mean sum scores from 5 out of 7 of the paired PSE questions (PSEQ 17, 18, 19, 22, and 23) improved. Only two (PSEQ 20 and 21) remained unchanged and there were no perceived self-efficacy mean scores that declined in the PES (See Table 16). Medical students who were paired as completing both the PS and PES (N=10) had a higher mean sum score for the nutrition and obesity knowledge question section for both the PS and PES compared to the total respondents for the PS-only (N=28) and the PES (N=11). This may be related to our 10 paired respondents reporting more prior nutrition training compared to the total 32 PS respondents (See Table 12). These students may have also been more motivated about learning nutrition than the non-PES respondents, which may present bias into the study. However, the paired respondents had a lower mean sum score for nutrition attitudes and perceived self-efficacy than the PS-only respondents. The nutrition and obesity knowledge grades for the paired respondents increased from a 68.9% in the PS to a 76.6% in the PES, and the increase in sum scores from the PS to PES may be considered marginally significant ($0.05<p\text{-value}<0.10$) with a mean of -3.6 ± 5.502 and p-value=0.068. The WBW content section of the PES was developed to evaluate the quality of the WBW tools and resources and the value of the WBW to medical students' education, as well as to revise the WBW in a way that best meets the needs of TAMHSC COM students.

6.4 Strengths and Limitations

One of the strengths of this study was that during the WBW development and revision phases, we collaborated with the TAMHSC COM. Two TAMHSC COM

students worked closely with our research team, and this enabled us to better understand the COM curriculum, and to develop the WBW to address specific needs in student education that the medical curriculum did not address.

In addition, the pretest survey allowed us to perform a baseline assessment of the degree of nutrition training our medical students are receiving during their undergraduate through medical school education so we can use the WBW to build upon this knowledge. Since our PES respondent rate was much lower than our PS respondent rate, one other advantage we had in evaluating our data and expected outcomes was the ability to pair 10 PES respondents to their corresponding pretest surveys. One of our greatest limitations in this study was the small PES respondent rate (N=11) and paired data sample (N=10). The participation in the WBW and surveys were voluntary, which may introduce bias into the study if only participants interested in nutrition and obesity cared to access the WBW. Furthermore, the knowledge test was not proctored so medical student respondents had the opportunity to access to the correct answers if they so desired. Finally, although certain questions from the PS and PES were derived from previously validated surveys and questionnaires [26, 27], our final survey was only tested for content clarity and time; it was not tested for construct validity and reliability.

7. RECOMMENDATIONS

Many suggestions were made during the focus group on how to encourage WBW participation by medical students. Unfortunately, with the time frame we were working with, these suggestions were unable to be carried out before data collection began (November 18, 2013-February 18th, 2014). In order to improve WBW participations suggestions for future implementation include either contacting COM faculty before Fall 2014 semester about integrating WBW nutrition and obesity resources into their course blocks, implementing the WBW as a two-week nutrition elective block for Spring 2015, or organizing a single "workshop day" where the COM students assemble in a designated place to access and evaluate the revised WBW for credit or incentive. Ultimately, the underlying motives to increase participation in the WBW are to make participation mandatory and require a grading component.

Since the PES respondent rate was much lower than the PS responded rate, I recommend positioning the accessible link to the PES on the Home page as well as on the final page of the WBW since students are allowed flexibility when navigating the WBW. By positioning the PES link on the Home page, students will see the link and be reminded to complete the survey each time they access the WBW. Also by making the WBW mandatory, PES survey participation would also be a mandatory component of the WBW, thereby increasing response rate.

From the qualitative data we received from the focus group and WBW content evaluation, it was clear that abundant and extensive resources need to be condensed or summarized to reduce fatigue caused by searching and reading through comprehensive

pages, handbooks and other resources. To address this, I recommend providing a 1-2 page summary of the content of each page in the WBW where medical students can find the needed information at a glance, rather than having to click through each resource trying to figure out the content of each resources by solely the descriptive title. Additionally, a search button, if feasible would be beneficial to participants in helping them find specific information and resources. For the next phase of this project, I also recommend analyzing the resources even further to remove any repeated or unnecessary resources from the WBW and then to categorize each of the tools and resources more specifically within the workshop. Furthermore, in order to put the use of the WBW resources into context, more research needs to be done on the COM curriculum content and provide a "bridge" between the science being taught in the curriculum and the practical, application-based resources WBW. In other words, the WBW must be adapted to coincide with the TAMHSC COM curriculum teachings. Other recommendations for improving the WBW are to develop and provide case studies to give medical students a clinically relevant need for the WBW. Case studies are useful tools to enhance self-directed learning, provide realistic and relevant application to future situations, as well as promote critical thinking, problem solving and communication skills [36]. Although few studies have been consistent in evaluating their effectiveness, the use of virtual patients has been increasing to meet the demands and barriers of the medical school curriculum. Virtual patient programs are currently being used in 136 medical schools [37] in the United States and are increasingly being used for clinical education. The use of virtual patients have resulted in higher learning outcomes and positive effects when

compared with non-intervention [38]. I believe the addition of these two components would give relevant application to the WBW as an online, self-paced, guided learning tool, which may produce significantly greater positive attitudes towards nutrition, perceived self-efficacy and knowledge outcomes for nutrition and obesity education in medical practice.

Finally, the goal of providing the nutrition and obesity educational tools and resources to medical students through the WBW is not to develop them into nutrition professionals. The goal is to provide them with evidence-based resources and tools to assess whether their patients are at risk for or currently have diagnosed chronic diseases that are related to weight management and dietary issues; and if so, be confident in recommending a dietary or weight loss intervention to their patients prior to initiating prescription medications that are both expensive and coincide with potential side-effects. For the next phase of this project, these goals should be reiterated throughout the WBW and all components of the workshop should support this vision: for medical students to understand the relationship between diet, obesity and chronic diseases, and their role as physicians in assessment; not necessarily weight-loss and nutrition counseling. Therefore, it is recommended that a higher emphasis be placed on the health care "team", specifically the roles and benefits (cost and health) of dietitians in health care. Although many revisions, improvements and expansions are necessary for the continuation of the WBW, this resource and the data gathered from this phase of the project provide a strong foundation to build upon.

8. CONCLUSIONS

The Web-Based Workshop: Nutrition and obesity education tools and resources, was well received by a select number of TAMHSC COM students. This study was the pilot phase of a three-year endeavor for developing and implementing the WBW. Because participation in this pilot test study was optional and self-selected, we did not have a large enough sample size to expect significant change in nutrition attitudes, perceived self-efficacy, and nutrition and obesity knowledge. Although not significant, we did observe an increase in positive attitudes towards the role of nutrition in medicine and their role in delivering nutrition education to their patients. Yet again, although not significant, medical students reported an increase in perceived self-efficacy and we observed a marginally significant increase in nutrition and obesity knowledge after accessing the WBW. As reported, the WBW enhanced medical students' knowledge of the relationship between diet and the prevention and treatment of obesity and chronic disease and would be recommended to other COM students by those who participated. Nevertheless, further steps need to be taken to revise and improve the components of the WBW for continuation into the next phase of this project.

REFERENCES

1. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity in the United States, 2009-2010. *NCHS Data Brief* 2012**:**1-8.

2. Zimmermann M, Kretchmer N. Isn't it time to teach nutrition to medical students? *American Journal of Clinical Nutrition* 1993, 58**:**828-829.

3. Bradley DW, Murphy G, Snetselaar LG, Myers EF, Quails LG. The incremental value of medical nutrition therapy in weight management. *Managed Care* 2013, 22**:**40-45.

4. Price JH, Desmond SM, Losh DP. Patients xxpectations of the family physician in health promotion. *American Journal of Preventive Medicine* 1991, 7**:**33-39.

5. Kushner RF. Barriers to providing nutrition counseling by physicians - Survey of primary-care practitioners. *American Journal of Clinical Nutrition* 1995, 61**:**897-897.

6. Adams KM, Kohlmeier M, Powell M, Zeisel SH. Nutrition in Medicine: Nutrition education for medical students and residents. *Nutrition in Clinical Practice* 2010, 25**:**471-480.

7. Adams KM, Kohlmeier M, Zeisel SH. Nutrition education in U.S. medical schools: latest update of a national survey. *Academic Medicine* 2010, 85**:**1537-1542.

8. Medicine HSCCo. 2012-2013 Curriculum. In *Texas A&M University System Health Science Center Doctor of Medicine Curriculum* Texas A&M University; 2012, 1-11.

9. Lindell KC, Adams KM, Kohlmeier M, Zeisel SH. The evolution of Nutrition in Medicine, a computer-assisted nutrition curriculum. *American Journal of Clinical Nutrition* 2006, 83**:**956s-962s.

10. Touger-Decker R. Nutrition education of medical and dental students: Innovation through curriculum integration. *American Journal of Clinical Nutrition* 2004, 79**:**198-203.

11. Kolasa KM, Jobe AC, Clay M, Daugherty J. Evaluating the use of a multimedia approach to teaching nutrition in medical school. *Journal of Nutrition Education* 1997, 29**:**351-355.

12. Lewis MJ, Davies R, Jenkins D, Tait MI. A review of evaluative studies of computer-based learning in nursing education. 2001. *Nurse Education Today* 2005, 25**:**586-597; discussion 598-600.

13. Greenhalgh T. Computer assisted learning in undergraduate medical education. *BMJ* 2001, 322**:**40-44.

14. Schifferdecker KE, Berman NB, Fall LH, Fischer MR. Adoption of computer-assisted learning in medical education: the educators' perspective. *Medical Education* 2012, 46**:**1063-1073.

15. Block JP, DeSalvo KB, Fisher WP. Are physicians equipped to address the obesity epidemic? Knowledge and attitudes of internal medicine residents. *Preventive Medicine* 2003, 36**:**669-675.

16. Story MT, Neumark-Stzainer DR, Sherwood NE, Holt K, Sofka D, Trowbridge FL, Barlow SE. Management of child and adolescent obesity: attitudes, barriers, skills, and training needs among health care professionals. *Pediatrics* 2002, 110**:**210-214.

17. Vetter ML, Herring SJ, Sood M, Shah NR, Kalet AL. What do resident physicians know about nutrition? An evaluation of attitudes, self-perceived proficiency and knowledge. *Journal of the American College of Nutrition* 2008, 27**:**287-298.

18. Zeizel SH, Fussell S, Kohlmeier M, Lasswell A, Cooksey K. The nutrition in medicine project. *Academic Medicine* 1996, 71**:**107-108.

19. Conroy MB, Delichatsios KH, Hafler JP, Rigotti NA. Impact of a preventive medicine and nutrition curriculum for medical students. *American Journal of Preventive Medicine* 2004, 27**:**77-80.

20. Cook DA, Gelula MH, Lee MC, Bauer BA, Dupras DM, Schwartz A. A web-based course on complementary medicine for medical students and residents improves knowledge and changes attitudes. *Teaching and Learning in Medicine* 2007, 19**:**230-238.

21. Maiburg BJ, Rethans JE, Schuwirth LT, Mathus-Vliegen LH, van Ree JW. Controlled trial of effect of computer-based nutrition course on knowledge and practice of general practitioner trainees. *American Journal of Clinical Nutrition* 2003, 77**:**1019s-1024s.

22. Weinsier RL, Boker JR, Brooks CM, Kushner RF, Visek WJ, Mark DA, Lopez A, Anderson MS, Block K. Priorities for nutrition content in a medical-school curriculum - A national consensus of medical educators. *American Journal of Clinical Nutrition* 1989, 50**:**707-712.

23. Mihalynuk TV, Knopp RH, Scott CS, Coombs JB. Physician informational needs in providing nutritional guidance to patients. *Family Medicine* 2004, 36**:**722-726.

24. Carlton DJ, Kicklighter JR, Jonnalagadda SS, Shoffner MB. Design, development, and formative evaluation of "put nutrition into practice," a multimedia nutrition education program for adults. *Journal of the American Dietetic Association* 2000, 100**:**555-563.

25. Kelly CJ. Invigorating the context and content of nutrition in medical education. *Academic Medicine* 2011, 86**:**1340-1340.

26. McGaghie WC, Van Horn L, Fitzgibbon M, Telser A, Thompson JA, Kushner RF, Prystowsky JB. Development of a measure of attitude toward nutrition in patient care. *American Journal of Preventive Medicine* 2001, 20**:**15-20.

27. Park KA, Cho WI, Song KJ, Lee YS, Sung IS, Choi-Kwon SM. Assessment of nurses' nutritional knowledge regarding therapeutic diet regimens. *Nurse Education Today* 2011, 31**:**192-197.

28. Feren A, Torheim LE, Lillegaard IT. Development of a nutrition knowledge questionnaire for obese adults. *Food and Nutrition Research* 2011, 55:7271.

29. Parmenter K, Wardle J. Development of a general nutrition knowledge questionnaire for adults. *European Jounal of Clinical Nutrition* 1999, 53**:**298-308.

30. Niederhauser VP, Mattheus D. The Anatomy of Survey Questions. *Journal of Pediatric Health Care* 2010, 24**:**351-354.

31. Krueger RA. *Focus groups : a practical guide for applied research.* 2nd edn. Thousand Oaks, Calif.: Sage Publications; 1994.

32. Coastal Services Center (U.S.). Introduction to conducting focus groups. In *Social science tools for coastal programs*. Charleston, SC: U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Coastal Services Center,; 2009:1 online resource (15 p.).

33. Cote-Arsenault D, Morrison-Beedy D. Practical advice for planning and conducting focus groups. *Nursing Research* 1999, 48**:**280-283.

34. Onwuegbuzie AJ, Dickinson, W. B., Leech, N. L., Zoran, A. G. A Qualitative Framework for Collecting and Analyzing Data in Focus Group Research. *International Journal of Qualitative Methods* 2009**,** 22:1-22.

35. Bertrand JT, Brown JE, Ward VM. Techniques for Analyzing Focus Group Data. *Evaluation Review* 1992, 16**:**198-209.

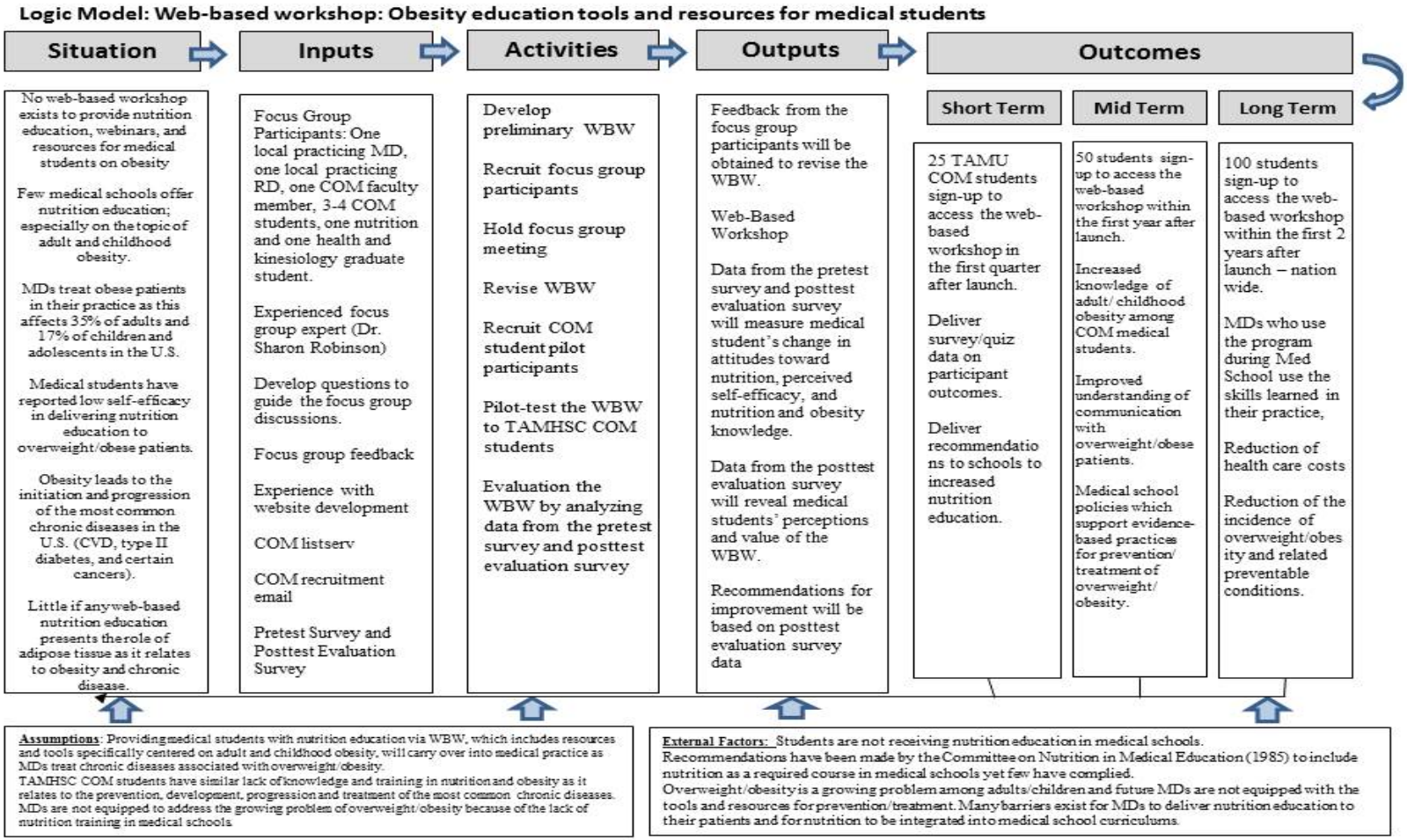
36. Tomey AM. Learning with cases. *Journal of Continuing Education in Nursing* 2003, 34**:**34-38.

37. Lang VJ, Kogan J, Berman N, Torre D. The evolving role of online virtual patients in internal medicine clerkship education nationally. *Academic Medicine* 2013, 88**:**1713-1718.

38. Cook DA, Erwin PJ, Triola MM. Computerized virtual patients in health professions education: a systematic review and meta-analysis. *Academic Medicine* 2010, 85**:**1589-1602.

APPENDIX A

LOGIC MODEL



APPENDIX B

GANTT CHART

June 2013-May 2014								
Overall Plan								
	Summer 2013		Fall 2013		Spring 2014			Summer 2014
Pre-Implementation								
Implementation								
Evaluation/Revision								

Pre-Implementation								
Summer 2013-Spring 2014	June	July	August	September	October	November	December	January
Pre-proposal meeting*								
Prepare and submit TAMU IRB application								
Content development for web-based workshop								
Proposal Development*								
Proposal Meeting*								
Recruitment of participants for focus group and pilot test								
Internal review of workshop prior to focus group/pilot test								
Focus group								
Revisions from focus group feedback								

Implementation					
Spring 2014	January	February	March	April	May
Pilot Test					
Thesis Development*					

Evaluation/Revision						
Spring-Summer 2014	January	February	March	April	May	Summer
Evaluate results from pilot test						
Revisions						
Thesis Development*						
Thesis Defense*						

APPENDIX C

WEB-BASED WORKSHOP OUTLINE

*Each of the bolded headings are the "tabs" our participants will navigate through. Most of which will house external resources, links, articles, handouts, videos etc…

1) **Home**
   a) **Pre-Test Survey**
   b) Purpose, Learning Objectives, Necessity of Obesity and Nutrition Education
   c) Navigating the WBW
2) **Obesity Background and Data**
3) **Nutrition and Diet** (Topic introductions and peer-reviewed literature included in each subtopic page)
   a) Evidence-Based Dietary Guidelines
      i) DGA's 2010 and DRI's
   b) Carbohydrates
      i) Fiber, Whole Grains, Sugars, Sugar Substitutes, Starchy and Non-Starchy Vegetables
      ii) Whole Grains Video
      iii) Carbohydrates Quiz
   c) Fat
      i) Types of Fats
      ii) Fats Quizzes
   d) Protein
   e) Fruits, Vegetables and Antioxidants
   f) Dietary Supplements
   g) Popular Weight-Loss Diets
      i) Vegetarian/Vegan, Popular Diets and Reviews, Fad Diets
   h) Diet Myths and Misconceptions
      i) Diet and Nutrition Myths, Health and Metabolism Myths
4) **Nutrition in Health and Disease** (Topic introductions and peer-reviewed literature included in each subtopic page)
   a) Overweight and Obesity
      i) Background, Childhood Obesity, Consequences, Prevention and Treatment
   b) Cardiovascular Disease
      i) AHA's Simple 7, MyLifeCheck and AHA's Nutrition Center, Managing Blood Pressure, Reducing Cholesterol, Sodium, Potassium,
   c) Type II DM

i) Lowering Your Risk, Nutrition and Diabetes, Physical Activity and Diabetes, Non-Modifiable Risk Factors,
ii) Diabetes Risk Test

d) Cancer
i) Development and Progression, Lifestyle Recommendations for Treatment and Prevention, Nutrition and Cancer

e) Physical Activity in Health and Disease

5) Obesity Assessment and Screening Tools

a) Assessments and Calculations
i) BMI Formula, Chart and Calculator
ii) Waist Circumference
iii) Measuring Body Fat
iv) Diet Analysis and Nutrient Needs
v) Infant Growth Charts

6) Changing Lifestyle Behaviors

a) Weight Management and Weight-Loss Strategies, Tips and Tools

b) Weight Loss Tips and Strategies for Children and their Parents

c) Reading Nutrition Facts Panel, Portion and Serving Sizes, and Empty Calories

7) Additional Resources

a) Resources Page 1
i) Clinically Relevant Resources for Medical Students and Physicians, Effective Communication Resources, Printable Education Handouts for Patients and Physicians

b) Resources Page 2
i) Social Media, Mobile Devices and Weight Management, Weight Management App Reviews by RDs, Other Health Apps and Reviews

c) Resources Page 3
i) Dietitians in Health Care, Frequently Asked Questions, Finding a Local Dietitian

8) Posttest Evaluation Survey

APPENDIX D

WEB-BASED WORKSHOP FOCUS GROUP QUESTIONS

***Workshop* Key Questions**

As you have seen from the workshop emailed to you, we included tools and resources on basic nutrition principles, 2) diets, myths and misconceptions, 3) obesity assessments, 4) nutrition and disease material, 5) methods for reducing disease risks, and communicating with patients, and 6) other resources including short patient/physician handouts, mobile health app reviews, and a dietitian's role in health care.

6. After viewing the workshop, what are your thoughts on the amount and quality of the *resources* provided?

7. In regards to the *content*, please finish this sentence: I would like to see more or less of...?

8. What are your thoughts on the *design, layout, and organization* of the workshop's webpage?

9. Suppose you were responsible for putting together this workshop for medical students. What would you change or do differently?

10. If you were in charge of pilot testing this workshop, how would you go about implementing this project to medical students and why?

Summary Question (if time available)

Lindsey will give us a 2-3 minute summary of the key ideas that emerged from the discussion.

11. Is this an adequate summary?

Ending question

12. Again, the purpose of this project is to pilot test a webinar and web-based workshop to provide medical students nutrition education training that includes tools and resources specifically focused on adult and childhood obesity. Your feedback is important to help us develop worthy nutrition and obesity educational training for our medical students. With that being said, is there anything we did not discuss that you think is important? Are there any suggestions would you like to add?

APPENDIX E

WEB-BASED WORKSHOP PRETEST SURVEY

Welcome to the Web-Based Workshop pilot study pre-test evaluation survey.

Thank you for participating – your responses and opinions are valuable to us.

A Web-Based Workshop has been designed to provide medical students with educational tools and resources on nutrition and obesity. Please complete the following Pre-Test Survey on nutrition, obesity, and obesity-related chronic health conditions before reviewing the online resources. Your responses are vital to the development of nutrition and obesity education for current and future medical students at Texas A&M University.

This is the first of two surveys. You will be prompted to complete a second Post-Test Survey after having accessed and reviewed the Web-Based Workshop.

At the completion of the second survey, you will have the option to enter your email address in a drawing for a chance to win one of four $25 gift certificates to Amazon.com.

Screening

1. Are you currently enrolled as a Texas A&M Health Science Center College of Medicine student?
    a. Yes (if this answer is selected the survey participant will be directed to question #2)
    b. No (if this answer is selected the survey participant will be disqualified and the survey will end))

Demographics

2. Gender (M/F)
3. Age (Fill in the blank)
4. What is your height? (Fill in the blank)
5. What is your weight? (Fill in the blank)
6. What year of medical school are you currently completing? (1st, 2nd, 3rd, 4th, other (fill in the blank response))
    a. For year 3 and 4 students: *In the past year, how many patients have you come into contact with who are overweight or obese*? (1-10; 11-20; >30; none)

7. Have you had any nutrition training prior to completing the Web-Based Workshop:
    a. Yes (if this answer is selected the survey participant will be directed to answer question #8)
    b. No (if this answer is selected the survey participant will be directed to answer question #9)
8. If yes, what prior coursework in nutrition or training have you received? (Check all that apply)
    a. At least 1 undergraduate class
    b. Nutrition major in college
    c. Masters in nutrition
    d. At least 1 graduate class
    e. Required nutrition course in medical school
    f. Elective nutrition course in medical school
    g. Other (fill in the blank)

On a scale of 1 to 5 please indicate the degree to which you strongly disagree (1) or strongly agree (5) with each of the statements below by selecting the appropriate number that best reflects how you feel before accessing the Web-Based Workshop.

Nutrition Attitudes

		Strongly Disagree				Strongly Agree
9.	A change towards a healthier lifestyle is important in any stage of life.	1	2	3	4	5
10.	Nutrition assessment and counseling should be included in any routine appointment, just like diagnosis and treatment.	1	2	3	4	5
11.	I have an obligation to improve the health of my patients by discussing nutrition with them.	1	2	3	4	5
12.	Most medical students are *not* adequately trained to discuss nutrition with patients.	1	2	3	4	5
13.	Most patients will try to change their lifestyle if I advise them to do so.	1	2	3	4	5
14.	Specific advice about how to make dietary changes could help patients improve their eating habits.	1	2	3	4	5

***Nutrition Attitudes* continued**

		Strongly Disagree				Strongly Agree
15.	For most patients, health education does *little* to promote adherence to a healthy lifestyle.	1	2	3	4	5
16.	It is important that I recommend dietary changes prior to initiating drug therapy whenever possible.	1	2	3	4	5

Perceived Self-Efficacy

17.	I feel comfortable with my ability to provide nutrition education with overweight/obese patients.	1	2	3	4	5
18.	I feel comfortable with my ability to provide physical activity education with overweight/obese patients.	1	2	3	4	5
19.	I feel comfortable with my ability to discuss strategies for disease prevention and treatment, including nutrition and lifestyle.	1	2	3	4	5
20.	I am likely to refer *overweight/obese* patients to a registered dietitian for dietary assessment and treatment.	1	2	3	4	5
21.	I am likely to refer *diabetic* patients to a registered dietitian for dietary assessment and treatment.	1	2	3	4	5
22.	I know where to find reliable online resources on general nutrition.	1	2	3	4	5
23.	I know where to find reliable online resources on physical activity.	1	2	3	4	5

Nutrition and Obesity Knowledge Test *(bolded answers indicate the correct answer)*

24. SD is a 50 year-old woman who wants to reduce her caloric intake enough to lose 1 pound per week. By how many calories must she reduce her intake each day to achieve her goal?
    a. **500 calories**
    b. 1000 calories
    c. 2000 calories
    d. 3500 calories
    e. I don't know

25. How many grams of carbohydrates are required for normal brain function?
    a. 55g
    b. **130g**
    c. 525g
    d. 1200g
    e. I don't know
26. What is the current minimum recommendation for physical activity?
    a. **2.5 hours of moderate intensity per week**
    b. 5 hours of moderate intensity per week
    c. 1 hour of moderate intensity per day
    d. 30 minutes vigorous intensity per day
    e. 1 hour light intensity per day.
    f. I don't know
27. Less than what percent of *trans* fats is recommended by the Dietary Guidelines for Americans?
    a. As low as possible
    b. >7%
    c. >10%
    d. >20-35%
    e. I don't know
28. *Intake of less than ___ mg of cholesterol is recommended for a healthful diet.
    a. 100
    b. 200
    c. 300
    d. 400
    e. 500
    f. I don't know
29. *Which dietary factor is *not* correlated with the prevention of cardiovascular disease?
    a. Vitamin C
    b. Vitamin E
    c. Fiber
    d. Fish oil
    e. Alcohol
    f. I don't know

30. Energy is provided by the oxidation of dietary protein, fat, carbohydrate, and alcohol. How many calories are in a gram of each nutrient? (Fill in the blank)

    a. Protein **4**
    b. Fat **9**
    c. Carbohydrate **4**
    d. I don't know

31. Metabolism of 150g carbohydrate, 20g fat, and 10g protein yields approximately how many kilocalories?

    a. 300 kcal
    b. 550 kcal
    c. **820 kcal**
    d. 1100 kcal
    e. I don't know

32. *The food that contains the highest amount of carbohydrate is ___.

    a. Chicken
    b. Cheese
    c. Potato
    d. Peanut butter
    e. Milk
    f. I don't know

33. *The food that contains the highest amount of fat is ___.

    a. Low-fat milk
    b. Orange juice
    c. Corn
    d. Honey
    e. Soy sauce
    f. I don't know

34. The mineral that decreases the risk of hypertension is ____.

    a. Sodium
    b. Potassium
    c. Iron
    d. Copper
    e. Zinc
    f. I don't know

35. Intake of which dietary components may *reduce* a patient's risk of developing obesity-related chronic diseases? Select all that apply.

    a. Refined carbohydrates
    b. **Vegetables**
    c. **Whole grains**
    d. Saturated fat
    e. **Monounsaturated fat**
    f. Salt
    g. **Whole Fruit**
    h. I don't know

36. What contributes to the *greatest* intake of sodium in the typical American diet? Choose all that apply.

    a. Adding salt to food
    b. **Breads and Rolls**
    c. **Sandwich Meat**
    d. Vinegar
    e. **Ready-Made Sauces and Dips**
    f. Baked Potatoes
    g. **Canned Soups**
    h. I don't know

37. Replacing saturated fats with unsaturated fats may reduce the risk of chronic metabolic diseases. All of the following foods are considered good sources of unsaturated fats *except*?

    a. Olive oil
    b. Avocados
    c. Salmon
    d. **Mozzarella cheese**
    e. Walnuts
    f. I don't know

For questions 38-43, please select one answer choice: Agree, Disagree, or I don't know

38. *Regularly consuming fatty fish, rich in omega-3 fatty acids, help to reduce hyperlipidemia. **A**
39. *Fruit should not be consumed by diabetic patients. **D**
40. *Starch foods such as bread, noodles, and rice should be monitored in diabetic patients. **A**
41. *Only carbohydrates should be restricted in diabetic patients. **D**
42. *Sodium does not have to be restricted for diabetic patients. **D**

43. *Carbohydrates such as bread, potatoes and noodles are fattening. **D**
44. Which strategy yields the safest and most effective results in long-term weight loss?
    a. Dietary modification
    b. Increased physical activity
    c. Weight-loss surger**y**
    d. **A and B**
    e. I don't know
45. AM is a 54-year-old postmenopausal woman who wants to lose weight. She is 5'6" (168cm) and weighs 190lb (86.4kg). What is her BMI?
    a. BMI = 19kg/m2
    b. BMI = 24kg/m2
    c. **BMI = 31kg/m2**
    d. BMI = 36kg/m2).
    e. I don't know
        i. AM's BMI suggests she is classified as ___

            1. Normal weight
            2. Overweight
            3. **Obese**
            4. Extreme obese (class II).
            5. I don't know
46. Waist-to-hip ratio measures health risk based on weight distribution in certain parts of the body. What is the minimum ratio that indicates heightened risk for heart attack, stroke, type II diabetes, and hypertension?
    a. Men: 0.8 women: 0.5
    b. **Men: 0.95 women: 0.8**
    c. Men: 1.2 women: 1.0
    d. Men: 2.0 women: 1.5
    e. I don't know
47. Which of the following medical conditions are associated with obesity?

    a. Diabetes
    b. Cardiovascular disease
    c. Osteoarthritis
    d. **All of the above**
    e. I don't know

48. *What is the recommended diet for diabetic patients?
    a. Standard American Diet
    b. A healthy, balanced diet
    c. A high carbohydrate diet
    d. A high fat diet
    e. A high protein, low carbohydrate diet
    f. I don't know
49. *An obese 45-year-old adult has blood cholesterol level of 239 mg/dL. Which of the following dietary therapy is the first recommended?
    a. Decrease monounsaturated fat
    b. Decrease polyunsaturated fat
    c. Decrease total fat
    d. Decrease cholesterol intake
    e. Decrease carbohydrate intake
    f. I don't know
50. *Which is recommended to supply essential fatty acids and lipid-soluble vitamins when trying to lose body weight?
    a. Vegetable oil
    b. Animal fat
    c. Fish oil supplement
    d. Animal protein
    e. Plant protein
    f. I don't know
51. *___ is not related with upper body obesity.
    a. Diabetes
    b. Hyperlipidemia
    c. Hypertension
    d. Kidney failure
    e. Myocardial infarction
    f. I don't know

For questions 52-53, please select one answer choice: Agree, Disagree, or I don't know

52. *There are more complications, such as hypertension and diabetes, associated with upper body obesity than lower body obesity. **A**
53. *Trans fats such as margarine are good substitutions for butter in patients with cardiovascular disease. **D**

APPENDIX F

WEB-BASED WORKSHOP POSTTEST EVALUATION SURVEY

This is the second and final of two surveys. Your honest feedback is valuable to help revise the Web-Based Workshop in order to provide the most necessary and relevant resources on nutrition and obesity for your future health profession. At the completion of this survey, you will have the option to enter your email address in a drawing for a chance to win one of four $25 gift certificates to Amazon.com.

Screening

1. Are you currently enrolled as a Texas A&M Health Science Center College of Medicine student? (Yes/No)

Demographics

2. Gender (M/F)
3. Age (Fill in the blank)
4. What is your height? (Fill in the blank)
5. What is your weight? (Fill in the blank)
6. What year of medical school are you currently completing? (1st, 2nd, 3rd, 4th, other (Fill in the blank response))
    a. For year 3 and 4 students: *In the past year how many patients have you come into contact with who are overweight or obese*? (1-10; 11-20; >30; none)
7. Have you had any nutrition training prior to completing the Web-Based Workshop:
    a. Yes (if this answer is selected the survey participant will be directed to answer question #8)
    b. No (if this answer is selected the survey participant will be directed to answer question #9)
8. If *Yes*, what prior coursework in nutrition or training have you received? (Check all that apply)
    a. At least 1 undergraduate class
    b. Nutrition major in college
    c. Masters in nutrition
    d. At least 1 graduate class
    e. Required nutrition course in medical school
    f. Elective nutrition course in medical school
    g. Other (Fill in the blank)

On a scale of 1 to 5 please indicate the degree to which you strongly disagree (1) or strongly agree (5) with each of the statements below by selecting the appropriate number that best reflects how you felt about your learning experience after utilizing the Web-Based Workshop.

Nutrition Attitudes

		Strongly Disagree				Strongly Agree
9.	A change towards a healthier lifestyle is important in any stage of life.	1	2	3	4	5
10.	Nutrition assessment and counseling should be included in any routine appointment, just like diagnosis and treatment.	1	2	3	4	5
11.	I have an obligation to improve the health of my patients by discussing nutrition with them.	1	2	3	4	5
12.	Most medical students are *not* adequately trained to discuss nutrition with patients.	1	2	3	4	5
13.	Most patients will try to change their lifestyle if I advise them to do so.	1	2	3	4	5
14.	Specific advice about how to make dietary changes could help patients improve their eating habits.	1	2	3	4	5
15.	For most patients, health education does *little* to promote adherence to a healthy lifestyle.	1	2	3	4	5
16.	It is important that I recommend dietary changes prior to initiating drug therapy whenever possible.	1	2	3	4	5

Perceived Self-Efficacy

17.	I feel comfortable with my ability to provide nutrition education with overweight/obese patients.	1	2	3	4	5
18.	I feel comfortable with my ability to provide physical activity education with overweight/obese patients.	1	2	3	4	5

***Perceived Self-Efficacy* continued**

		Strongly Disagree				Strongly Agree
19.	I feel comfortable with my ability to discuss strategies for disease prevention and treatment, including nutrition and lifestyle.	1	2	3	4	5
20.	I am likely to refer *overweight/obese* patients to a registered dietitian for dietary assessment and treatment.	1	2	3	4	5
21.	I am likely to refer *diabetic* patients to a registered dietitian for dietary assessment and treatment.	1	2	3	4	5
22.	I know where to find reliable online resources on general nutrition.	1	2	3	4	5
23.	I know where to find reliable online resources on physical activity.	1	2	3	4	5

On a scale of 1 to 5 please indicate the degree to which you strongly disagree (1) or strongly agree (5) with each of the statements below after having utilized the Web-Based Workshop resources.

Web-Based Workshop Content

24.	The Web-Based Workshop enhanced my knowledge of the relationship between diet and the prevention and treatment of obesity and chronic disease.	1	2	3	4	5
25.	The resources provided were of the highest quality.	1	2	3	4	5
26.	The resources provided were the most applicable to medical students.	1	2	3	4	5
27.	I prefer a self-paced, self-directed, web-based workshop to a traditional, face-to-face, lecture course in nutrition.	1	2	3	4	5
28.	The design, layout and components of the Web-Based Workshop were accessible and easy to navigate.	1	2	3	4	5
29.	In the future, I will likely utilize the resources provided in the Web-Based Workshop.	1	2	3	4	5

***Web-Based Workshop Content* continued**

		Strongly Disagree				Strongly Agree
30.	I will recommend this Web-Based Workshop to other COM students.	1	2	3	4	5
31.	I would likely pay a quarterly fee to access the Web-Based Workshop.	1	2	3	4	5

32. Did you experience any technical problems while accessing the Web-Based Workshop? (Yes/No).
    a. If "Yes" please explain (open ended)
33. What resources currently not available on the Web-Based Workshop would you like to see added? (open ended)
34. Please provide us with other feedback to improve the Web-Based Workshop for medical students. (open ended)

Nutrition and Obesity Knowledge Test

35. SD is a 50 year-old woman who wants to reduce her caloric intake enough to lose 1 pound per week. By how many calories must she reduce her intake each day to achieve her goal?
    a. **500 calories**
    b. 1000 calories
    c. 2000 calories
    d. 3500 calories
    e. I don't know
36. How many grams of carbohydrates are required for normal brain function?
    a. 55g
    b. **130g**
    c. 525g
    d. 1200g
    e. I don't know
37. What is the current minimum recommendation for physical activity?
    a. **2.5 hours of moderate intensity per week**
    b. 5 hours of moderate intensity per week
    c. 1 hour of moderate intensity per day
    d. 30 minutes vigorous intensity per day
    e. 1 hour light intensity per day.
    f. I don't know

38. Less than what percent of *trans* fats is recommended by the Dietary Guidelines for Americans?
    a. As low as possible
    b. >7%
    c. >10%
    d. >20-35%
    e. I don't know
39. *Intake of less than___mg of cholesterol is recommended for a healthful diet.
    a. 100
    b. 200
    c. 300
    d. 400
    e. 500
    f. I don't know
40. *Which dietary factor is *not* correlated with the prevention of cardiovascular disease?
    a. Vitamin C
    b. Vitamin E
    c. Fiber
    d. Fish oil
    e. Alcohol
    f. I don't know
41. Energy is provided by the oxidation of dietary protein, fat, carbohydrate, and alcohol. How many calories are in a gram of each nutrient? (Fill in the blank)
    a. Protein **4**
    b. Fat **9**
    c. Carbohydrate **4**
    d. I don't know
42. Metabolism of 150g carbohydrate, 20g fat, and 10g protein yields approximately how many kilocalories?
    a. 300 kcal
    b. 550 kcal
    c. **820 kcal**
    d. 1100 kcal
    e. I don't know

43. *The food that contains the highest amount of carbohydrate is ___.
    a. Chicken
    b. Cheese
    c. Potato
    d. Peanut butter
    e. Milk
    f. I don't know
44. *The food that contains the highest amount of fat is ___.
    a. Low-fat milk
    b. Orange juice
    c. Corn
    d. Honey
    e. Soy sauce
    f. I don't know
45. The mineral that decreases the risk of hypertension is ____.
    a. Sodium
    b. Potassium
    c. Iron
    d. Copper
    e. Zinc
    f. I don't know
46. Intake of which dietary components may *reduce* a patient's risk of developing obesity-related chronic diseases? Select all that apply.

    a. Refined carbohydrates
    b. **Vegetables**
    c. **Whole grains**
    d. Saturated fat
    e. **Monounsaturated fat**
    f. Salt
    g. **Fruit**
    h. I don't know

47. What contributes to the *greatest* intake of sodium in the typical American diet? Choose all that apply.
    a. Adding salt to food
    b. **Breads and Rolls**
    c. **Sandwich Meat**
    d. Vinegar
    e. **Ready-Made Sauces and Dips**
    f. Baked Potatoes
    g. **Canned Soups**
    h. I don't know
48. Replacing saturated fats with unsaturated fats may reduce the risk of chronic metabolic diseases. All of the follow foods are considered good sources of unsaturated fats *except*?
    a. Olive oil
    b. Avocados
    c. Salmon
    d. **Mozzarella cheese**
    e. Walnuts
    f. I don't know

For questions 49-54, please select one answer choice: Agree, Disagree, or I don't know

49. *Regularly consuming fatty fish, rich in omega-3 fatty acids, help to reduce hyperlipidemia. **A**
50. *Fruit should not be consumed by diabetic patients. **D**
51. *Starch foods such as bread, noodles, and rice should be monitored in diabetic patients. **A**
52. *Only carbohydrates should be restricted in diabetic patients. **D**
53. *Sodium does not have to be restricted for diabetic patients. **D**
54. *Carbohydrates such as bread, potatoes and noodles are fattening. **D**
55. Which strategy yields the safest and most effective results in long-term weight loss?
    a. Dietary modification
    b. Increased physical activity
    c. Weight-loss surgery
    d. **A and B**
    e. I don't know

56. AM is a 54-year-old postmenopausal woman who wants to lose weight. She is 5'6" (168cm) and weighs 190lb (86.4kg). What is her BMI?
    a. BMI = 19kg/m2
    b. BMI = 24kg/m2
    c. **BMI = 31kg/m2**
    d. BMI = 36kg/m2).
    e. I don't know
        i. AM's BMI suggests she is classified as ___

            1. Normal weight
            2. Overweight
            3. **Obese**
            4. Extreme obese (class II).
            5. I don't know
57. Waist-to-hip ratio measures health risk based on weight distribution in certain parts of the body. What is the minimum ratio that indicates heightened risk for heart attack, stroke, type II diabetes, and hypertension?
    a. Men: 0.8 women: 0.5
    b. **Men: 0.95 women: 0.8**
    c. Men: 1.2 women: 1.0
    d. Men: 2.0 women: 1.5
    e. I don't know
58. Which of the following medical conditions are associated with obesity?

    a. Diabetes
    b. Cardiovascular disease
    c. Osteoarthritis
    d. **All of the above**
    e. I don't know
59. *What is the recommended diet for diabetic patients?
    a. Standard American Diet
    b. A healthy, balanced diet
    c. A high carbohydrate diet
    d. A high fat diet
    e. A high protein, low carbohydrate diet
    f. I don't know

60. *An obese 45-year-old adult has blood cholesterol level of 239 mg/dL. Which of the following dietary therapy is the first recommended?
    a. Decrease monounsaturated fat
    b. Decrease polyunsaturated fat
    c. Decrease total fat
    d. Decrease cholesterol intake
    e. Decrease carbohydrate intake
    f. I don't know
61. *Which is recommended to supply essential fatty acids and lipid-soluble vitamins when trying to lose body weight?
    a. Vegetable oil
    b. Animal fat
    c. Fish oil supplement
    d. Animal protein
    e. I don't know
    f. Plant protein
62. *___ is not related with upper body obesity.
    a. Diabetes
    b. Hyperlipidemia
    c. Hypertension
    d. Kidney failure
    e. Myocardial infarction
    f. I don't know

For questions 63-64, please select one answer choice: Agree, Disagree, or I don't know

63. *There are more complications, such as hypertension and diabetes, associated with upper body obesity than lower body obesity. **A**
64. *Trans fats such as margarine are good substitutions for butter in patients with cardiovascular disease. **D**